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CORRECTION

Volume 59, June, 1931, page 255: In Table 1, *Middle Atlantic States*, Reading's sea-level pressure, recorded "29.77," should be "29.97."

MONTHLY WEATHER REVIEW

Editor, W. J. HUMPHREYS

VOL. 60, NO. 7
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JULY, 1932

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COLLECTED SCIENTIFIC PAPERS OF WILLIAM HENRY DINES, B. A., F. R. S.

[Published by the Royal Meteorological Society, London, 1931]

By W. R. GREGG

Of the almost countless papers, monographs, notes, etc., that appear from month to month in meteorological journals and elsewhere, only a very few engage our attention beyond a first reading. Many we do not even finish reading. Others we read through, with interest, and perhaps jot down a note or two for future use, then send them to file, whence they are never removed except for dusting.

But every now and then there appears one that holds our interest from beginning to end. We read it a second time. We have it durably bound and place it on our desk for ready reference. It contains a mine of information that we want to be able to consult quickly and frequently. Such a paper is Dines's "The Characteristics of the Free Atmosphere." It was published in 1919 by the British Meteorological Office as Geophysical Memoir No. 13. Since only a few copies were received for the Weather Bureau's use, it was the present reviewer's privilege and pleasure to prepare a rather complete abstract for publication in the MONTHLY WEATHER REVIEW[1] in order that the data and conclusions might be available to all of the Bureau's personnel.

This monograph sums up the results of nearly thirty years' work in investigating the upper air, in the course of which many other papers had been published, either as official documents or in scientific periodicals. These are now presented, for the most part in chronological order, in the "Collected Papers." They form Section II, and are preceded by an introduction by Dines's elder son, L. H. G. Dines. Aside from the "Characteristics," the more important papers in this Section are "The Free Atmosphere in the Region of the British Isles," "Further Contributions to the Investigation of the Upper Air. Total and Partial Correlation Coefficients Between Sundry Variables of the Upper Air," "The Correlation Between Pressure and Temperature in the Upper Air with a Suggested Explanation," and "An Examination of British Upper Air Data in the Light of the Norwegian Theory of the Structure of the Cyclone," this last in collaboration with L. H. G. Dines.

Students of Aerology have always welcomed contributions by W. H. Dines and have wanted to refer to some of them at least, from time to time, since their appearance. But this has been difficult, owing to their being widely scattered in different publications. It is particularly gratifying, therefore, to have them presented in this one volume, which has the added interest of enabling the reader to note the gradual development of Dines's conceptions of the structure of the atmosphere in the light of an ever-increasing body of information, largely accumulated through the efforts of Dines himself. For Dines was a pioneer, not only in analyzing the data but also in planning ways and means for obtaining those data. Even more, he designed and fabricated much of the instrumental and other apparatus used in the observational work. And so it is fitting that Section I of this volume should contain papers under the general heading "Anemometry and Instrument Design." An appreciative introduction is provided by F. J. W. Whipple. Even a mere reading of the titles discloses the wide range of Dines's inventive genius. As Whipple states, he designed instruments "meeting nearly all the needs of the meteorologist." Working often with limited funds and with comparatively crude materials, he produced nevertheless what was needed for the particular job in hand. No time was wasted in realizing a higher degree of precision than the character of the problem warranted. But there was always sufficient accuracy for his purpose. Best known in this country are his pressure tube anemograph and sounding balloon meteorograph. The anemograph forms part of the official instrumental set-up at the central office in Washington, and its records have provided much of value in investigations of gustiness, as applied to aerodynamic problems. The meteorograph is still a standard instrument in Great Britain, and is used elsewhere also. It is inexpensive and light—two desirable qualities in this work in which there is a fairly high percentage of loss and in which the height attained is naturally greater, the lighter the load.

Section III contains Dines's papers on "Radiation," with an introduction by E. Gold. Dines had been giving considerable thought to this subject as early as 1917, but devoted his entire time to it after 1922. Again he was the pioneer, and again, finding no suitable tools to work with, he designed some of his own, notably the ether differential radiometer. Included in the papers here reproduced are "The Heat Balance of the Atmosphere," "Atmospheric and Terrestrial Radiation," and, with L. H. G. Dines as coauthor, "Monthly Mean Values of Radiation from Various Parts of the Sky at Benson, Oxfordshire."

[1] Monthly Weather Review, Vol. 47, September, 1919, pp. 644-647.

In a final Section IV, under the heading "Miscellaneous Papers," with an introduction by R. G. K. Lempert, are grouped those contributions that could not be placed in any of the three larger classifications. Of chief interest, perhaps, are "The Element of Chance Applied to Various Meteorological Problems" and "Climate."

This book is published, as a memorial, by the Royal Meteorological Society. There is a preface by the chairman of the committee, Sir Richard Gregory, and an appreciative tribute by Dines's close friend and coworker, Sir Napier Shaw. Since Dines did not write a book embodying the results of his researches, it is particularly fitting that his contributions to meteorological science, all of them interesting, many of them of permanent value, should be available in one place for the benefit of investigators in this field. Meteorologists generally are indebted and grateful to the Royal Meteorological Society for bringing this about.

A CONTRAST IN THUNDERSTORMS

By W. J. HUMPHREYS

Every one recognizes this contrast as soon as it is mentioned, but no one says anything about it. At any rate it is not generally stressed. The contrast is this: One class of thunderstorms can not develop *without* wind; another class can not develop *with* wind. Promotion of either is prevention of the other.

Vigorous vertical convection of air rich in water vapor is essential to the genesis of any and every thunderstorm. This convection may be mechanically caused, as by a high mountain ridge across the course of the wind, or by cooler air in the path of warmer, the condition along the warm front of a cyclone. More commonly, however, it results from instability induced by cooling above or heating below, or a combination of both. The cooling above is owing chiefly to the importation of relatively cold air, accentuated more or less, especially at night when cloudy, by radiation. The heating below, on the contrary, usually is produced by sunshine, though in some cases importation of warm air is its major if not sole origin.

Two of the great causes of thunderstorms, therefore, are, (*a*) cooling above by the importation of cold air, and (*b*) warming below by insolation. The first is the "cold front" or squall-line thunderstorm, of which there are two classes, the entrapped and the driven; the second, the well-known "heat" thunderstorm. The squall-line storm is induced by a great mass of relatively cold air moving rapidly forward into or crowding against comparatively warm air. Since the velocity of the cold air is much less near the surface than it is at considerable heights, it follows that when the difference in temperature is rather small isolated masses of the warmer air are continually being entrapped by the far overrunning wedge of cooler air, and thereby forced to ascend more or less vigorously. Some of these ascending masses develop thunderstorms. Other squall thunderstorms are caused by the forced ascent of the warm air immediately ahead of the blunt front of the oncoming relatively quite cold air. In none of these cases can the warm air be entrapped or driven to a strenuous convection in front of the cold tip in the free air, except when that cold air is moving forward speedily. If it were moving very slowly it would just spread out gently beneath the warmer air, entrapping none of it, nor compelling a vigorous uprush anywhere. Hence this abundant and impressive class of thunderstorm, induced by cooling above, is caused by winds. A calm would prevent its formation—it can not occur in still air.

The heat thunderstorm, on the other hand, induced by insolation, must have rather quiet air for its genesis. It grows up from small to larger and larger convections of warm air from the surface. To be effective the chimney of warm air thus formed must remain intact and more or less vertical even though it may wander away to a greater or less distance horizontally. Obviously, however, it could neither remain vertical, if formed, nor intact in air that has any considerable horizontal velocity—could not remain vertical because the velocity of every wind varies with height, nor intact because every wind is turbulent, especially in its lower layers.

In short, and in general, thunderstorms incident to cooling above occur only in winds and never in calms, while those incident to heating below form only in calms and never in winds. And these are the greatest classes of thunderstorms—the wind-hatched and the calm-brooded.

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C. FITZHUGH TALMAN, in Charge of Library

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SOLAR OBSERVATIONS

SOLAR RADIATION MEASUREMENTS DURING JULY, 1932

By IRVING F. HAND, Assistant in Solar Radiation Investigations

For a description of instruments employed and their exposures, the reader is referred to the January, 1932, REVIEW, page 26.

Table 1 shows that solar radiation intensities averaged well above normal values for July at all three stations at which normal incidence measurements are made.

Table 2 shows an excess in the total solar radiation received on a horizontal surface at all pyrheliometric stations except La Jolla and Twin Falls. The excess is very marked at Washington, Madison, Chicago, New York, and Fresno.

Table 3 shows diminished turbidity for the month as would be expected with the decided increase in radiation receipt at Washington.

Polarization measurements obtained on seven days at Washington give a mean of 62 per cent and a maximum of 66 per cent on the 30th. At Madison, measurements obtained on 14 days give a mean of 60 per cent and a maximum of 67 per cent on the 12th. These are average July values for Madison, but for Washington the values are considerably above the July normals.

Unquestionably the decided increase in solar radiation received, owing to the greater transmissibility of the atmosphere during July throughout the country, has been a factor in the extreme dryness of the sections which are deficient in precipitation.

TABLE 1.—*Solar radiation intensities during July, 1932*

[Gram calories per minute per square centimeter of normal surface]

Washington, D. C.

Date	Sun's zenith distance									
	8 a.m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°	Noon
	75th mer. time	Air mass									Local mean time
		A. M.					P. M.				
	e.	5.0	4.0	3.0	2.0	[1] 1.0	2.0	3.0	4.0	5.0	e.
	mm.	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mm.*
July 2	9. 83		0. 65			0. 77					8. 48
July 5	10. 21				0. 97	1. 22	1. 49				9. 47
July 7	16. 79						1. 15				16. 20
July 8	14. 10					1. 13	1. 35				10. 97
July 9	11. 38	0. 68	0. 77	0. 91	1. 10	1. 37					9. 47
July 11	16. 20		0. 83	0. 93	1. 12	1. 42					16. 79
July 13	13. 13				0. 99	1. 39	1. 10				10. 59
July 18	12. 68			1. 07							12. 24
July 25	13. 61				1. 15	1. 40					9. 47
July 28	18. 59			0. 71	0. 94						17. 37
July 30	9. 83			1. 04	1. 24	1. 47					8. 48
Means		(0. 68)	0. 75	0. 94	1. 07	1. 41	(1. 12)				
Departures		+0. 09	+0. 08	+0. 16	+0. 16	+0. 21	+0. 13				

TABLE 1.—*Solar radiation intensities during July, 1932*—Contd

[Gram calories per minute per square centimeter of normal surface]

Madison, Wis.

Date	Sun's zenith distance									
	8 a.m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°	Noon
	75th mer. time	Air mass									Local mean time
		A. M.					P. M.				
	e.	5.0	4.0	3.0	2.0	[1] 1.0	2.0	3.0	4.0	5.0	e.
	mm.	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mm.*
July 2	7. 87				1. 29	1. 54					7. 87
July 6	14. 60			0. 99	1. 17	1. 40					13. 13
July 7	13. 61					1. 42					9. 83
July 8	11. 81			0. 99	1. 15	1. 38					10. 97
July 11	10. 59				1. 19	1. 43	1. 13	1. 05	0. 97		10. 21
July 12	9. 47		0. 89	1. 00	1. 18	1. 44	1. 09	0. 89	0. 76		13. 61
July 13	18. 59			0. 82	1. 02	1. 34	1. 02	0. 78	0. 64		19. 89
July 14	13. 13		0. 64								19. 89
July 15	18. 59		0. 71	0. 81	1. 07	1. 26					22. 00
July 18	13. 61					1. 33	1. 13	0. 94			15. 65
July 20	14. 60			0. 86	1. 03						18. 59
July 21	19. 23		0. 74				1. 26				17. 96
July 22	10. 21					1. 41	1. 25	1. 06			10. 59
July 23	10. 97		0. 86	1. 04	1. 21	1. 43					10. 59
July 26	16. 65		0. 73								19. 89
July 27	10. 97				1. 19	1. 34		0. 79			11. 81
July 28	16. 79		0. 84	0. 97							13. 13
July 29	9. 14		0. 95	1. 12	1. 24	1. 47					9. 14
July 30	10. 59		0. 92	1. 06	1. 20	1. 44					10. 59
Means			0. 81	0. 97	1. 16	1. 40	1. 15	0. 92	0. 79		
Departures			+0. 01	+0. 05	+0. 10	+0. 10	+0. 11	+0. 01	+0. 01		

Lincoln, Nebr.

July 1	9. 47					1. 47	1. 26	1. 11	0. 98	0. 86	10. 59
July 7	16. 20					1. 44	1. 23	1. 05	0. 88	0. 75	14. 60
July 9	18. 59						1. 09				20. 57
July 12	17. 37					1. 42	1. 14	0. 97	0. 82	0. 69	16. 20
July 13	17. 37		0. 81	0. 95	1. 12	1. 36					18. 59
July 14	18. 59			0. 93	1. 10	1. 33	1. 00	0. 80	0. 65		14. 60
July 19	16. 79		0. 63	0. 79	1. 01	1. 30					16. 20
July 21	18. 59				1. 11	1. 33					18. 59
July 22	16. 20						1. 21	1. 02			13. 61
July 26	18. 59	0. 75	0. 85	1. 04	1. 22	1. 45	1. 15	0. 95	0. 83	0. 71	14. 10
July 27	16. 20					1. 38	1. 15	0. 97	0. 83	0. 74	16. 79
July 28	18. 59		0. 78	0. 92	1. 07						17. 37
Means		(0. 75)	0. 78	0. 93	1. 10	1. 39	1. 15	0. 98	0. 83	0. 74	
Departures		±0. 00	±0. 00	+0. 03	+0. 02	+0. 06	+0. 08	+0. 09	+0. 07	+0. 02	

[1] Extrapolated.

TABLE 2.—*Average daily totals of solar radiation (direct+diffuse) received on a horizontal surface*

Week beginning	Washington	Madison	Lincoln	Chicago	New York	Fresno	Pittsburgh	Fairbanks	Twin Falls	La Jolla	Gainesville	Miami	New Orleans
	Gram calories per square centimeter												
1932	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.
July 2	500	502	563	454	528	720	435	449	712	290	678	606	369
July 9	591	618	636	587	653	721	572	459	516	479	588	601	385
July 16	465	590	595	559	527	715	500	357	580	406	440	577	358
July 23	554	571	527	597	559	697	529	442	578	457	439	550	322
	Departures from weekly normals												
July 2	−2	−29	−14	−5	+98	+36	−49		+90	−128	+152	+44	
July 9	+99	+82	+60	+156	+230	+49	+78		−76	+68	+76	+40	
July 16	−8	+71	+25	+125	+112	+63	+8		−8	−36	−68	+10	
July 23	+64	+68	−17	+159	+150	+71	+27		−5	+17	−71	−20	
	Accumulated departures on July 29, 1932												
	+3,332	+723	−1,391	+11,657	+14,114	+5,506	+3,374		−6,505	+3,208		+3,068	

TABLE 3.—*Solar radiation measurements, and determinations of atmospheric turbidity factor, β. Washington, D. C., July, 1932*

Date and solar hour angle	Solar altitude, h.	Air mass, m.	I_m	I_y	I_r	β	Blueness of sky	Atmospheric dust particles per cubic centimeter	Notes (skylight) polarization, P; clouds
July 5	° ′		gr. cal.	gr. cal.	gr. cal.				
4:47 a	27–52	2.12	1.200	*0.858*	0.661	0.040		672	
4:42 a	28–49	2.06	1.208	.849	*.669*	.045	5		P=64.
4:06 a	35–51	1.71	1.288	.902	*.694*	.045			
4:00 a	37–00	1.66	1.306	*.909*	.702	.045			Cumuli.
July 9									
5:28 a	19–49	2.92	0.905	*.608*	.570	.090		613	
5:24 a	20–34	2.82	.938	.617	*.575*	.085			
5:08 a	23–35	2.50	.987	.747	*.596*	.085			
5:04 a	24–23	2.42	1.001	*.752*	.602	.085			
3:50 a	38–43	1.60	1.180	.853	*.660*	.090	5		P=64.[1]
3:46 a	39–28	1.56	1.183	*.859*	.666	.096			
2:42 a	51–50	1.27	1.273	.888	*.705*	.110			
2:38 a	52–34	1.26	1.270	*.891*	.709	.120			Fr. Cu.
July 11									
5:52 a	15–08	3.84	.853	.641	*.517*	.055		750	
5:46 a	16–16	3.56	.880	.648	*.523*	.065			Cirri.
5:21 a	21–00	2.78	.958	*.711*	.551	.115			
July 13									
4:55 a	25–48	2.20	.929	*.658*	.549	.105		777	Cirrus haze.
4:49 a	27–01	2.20	.917	.664	*.554*	.120	5		P=64.
3:29 a	42–32	1.48	1.150	*.764*	.648	.120			
3:26 a	43–04	1.46	1.162	*.769*	*.651*	.120			
0:55 a	69–18	1.07	1.350	.899	*.675*	.070			
0:50 a	69–50	1.06	1.310	*.900*	.676	.085			
3:22 p	43–49	1.44	1.265	*.881*	.678	.075			
3:26 p	43–05	1.46	1.248	.878	*.676*	.045			
4:11 p	34–19	1.77	1.156	.823	*.643*	.080			
4:14 p	33–45	1.80	1.170	*.822*	.642	.070			
July 25									
5:05 a	21–27	2.69	1.007	.762	*.604*	.070		538	
5:01 a	23–26	2.51	1.034	.766	*.607*	.070			
4:20 a	31–22	1.92	1.170	*.825*	.648	.065	4		P=59.
4:17 a	32–07	1.89	1.179	.828	*.649*	.060			
3:24 a	42–14	1.49	1.254	*.878*	.683	.080			
3:20 a	43–00	1.46	1.263	.881	*.685*	.085			
2:04 a	57–02	1.19	1.323	.923	*.728*	.105			
2:00 a	57–44	1.18	1.350	*.926*	.725	.095			Fr. Cu.
July 28									
5:32 a	17–03	3.39	.636	.504	*.424*	.130		773	Sky clearing; following clouds.
5:26 a	18–13	3.31	.630	*.507*	.430	.140			
4:42 a	26–44	2.21	.890	*.651*	.522	.120			
4:38 a	27–29	2.16	.888	.654	*.519*	.120	4		P=60.
3:09 a	44–42	1.42	1.019	*.726*	.587	.160			
3:05 a	45–27	1.39	1.046	.723	*.584*	.155			Cirri.
July 30									
5:00 a	21–11	2.75	1.090	*.811*	.639	.050		498	
4:47 a	25–26	2.33	1.162	*.823*	.657	.045			
4:42 a	26–23	2.25	1.168	.826	*.660*	.045	5		P=66.
3:36 a	39–16	1.58	1.327	.902	.713	.045			
3:33 a	39–51	1.56	1.293	*.905*	.716	.070			Cumuli.

POSITIONS AND AREAS OF SUN SPOTS

[Communicated by Capt. J. F. Hellweg, Superintendent United States Naval Observatory. Data furnished by Naval Observatory, in cooperation with Harvard, Yerkes, Perkins, and Mount Wilson Observatories. The differences of longitude are measured from central meridian, positive west. The north latitudes are plus. Areas are corrected for foreshortening and are expressed in millionths of sun's visible hemisphere. The total area, including spots and groups, is given for each day in the last column]

Date	Eastern standard civil time	Heliographic			Area		Total area for each day
		Diff. long.	Longitude	Latitude	Spot	Group	
1932	H m	°	°	°			
July 1 (Naval Observatory)	10 29	−54.0	281.8	−8.0	77	------	------
		+13.0	348.8	+12.0	------	108	185
July 2 (Naval Observatory)	10 54	−57.0	265.4	−9.0	------	15	------
		−41.0	281.4	−9.0	77	------	------
		+27.0	349.4	+12.0	------	62	154
July 3 (Naval Observatory)	12 33	−42.0	266.2	−9.0	------	93	------
		−28.0	280.2	−9.0	62	------	155
July 4 (Mount Wilson)	12 15	−67.0	228.1	−12.0	9	------	------
		−29.0	266.1	−8.0	------	153	------
		−15.0	280.1	−8.0	34	------	196
July 5 (Naval Observatory)	11 49	−14.0	268.1	−9.0	------	77	------
		−1.0	281.1	−9.0	15	------	92
July 6 (Mount Wilson)	11 30	−2.0	267.0	−8.0	------	120	120
July 7 (Naval Observatory)	13 2	+9.0	264.0	−8.0	15	------	------
		+17.0	272.0	−10.0	------	93	108
July 8 (Naval Observatory)	11 49	+22.0	264.4	−8.0	15	------	------
		+30.0	272.4	−10.0	93	------	108
July 9 (Naval Observatory)	14 19	+45.0	272.8	−9.0	123	------	123
July 10 (Naval Observatory)	11 10	+58.0	274.3	−9.0	93	------	93
July 11 (Naval Observatory)	12 14	+73.0	275.5	−9.0	93	------	93
July 12 (Naval Observatory)	14 25	No spots			------	------	------
July 13 (Naval Observatory)	12 28	−39.0	136.9	−11.0	------	31	31
July 14 (Naval Observatory)	12 4	No spots			------	------	------
July 15 (Mount Wilson)	18 0	No spots			------	------	------
July 16 (Naval Observatory)	13 3	No spots			------	------	------
July 17 (Naval Observatory)	12 34	No spots			------	------	------
July 18 (Naval Observatory)	10 12	No spots			------	------	------
July 19 (Naval Observatory)	13 3	No spots			------	------	------
July 20 (Naval Observatory)	11 38	No spots			------	------	------
July 21 (Mount Wilson)	16 45	−38.0	29.6	−2.0	------	9	9
July 22 (Naval Observatory)	11 8	No spots			------	------	------
July 23 (Naval Observatory)	10 30	No spots			------	------	------
July 24 (Naval Observatory)	10 15	No spots			------	------	------
July 25 (Naval Observatory)	13 15	No spots			------	------	------
July 26 (Naval Observatory)	11 21	No spots			------	------	------
July 27 (Naval Observatory)	11 42	−76.0	275.1	−9.0	185	------	185
July 28 (Naval Observatory)	11 18	−63.0	275.1	−9.0	185	------	185
July 29 (Naval Observatory)	11 20	−49.0	275.9	−9.0	216	------	216
July 30 (Naval Observatory)	10 33	−39.0	273.1	−9.0	216	------	216
July 31 (Naval Observatory)	10 29	−25.0	273.9	−9.0	216	------	216
Mean daily area for July							080

PROVISIONAL SUN-SPOT RELATIVE NUMBERS FOR JULY, 1932

(Dependent alone on observations at Zurich and its station at Arosa)

[Data furnished through the courtesy of Prof. W. Brunner, University of Zurich, Switzerland

July, 1932	Relative numbers	July, 1932	Relative numbers	July, 1932	Relative numbers	July, 1932	Relative numbers	July, 1932	Relative numbers	July, 1932	Relative numbers
1	*a* 21	6	*a* 21	11	9	16	0	21	0	26	0
2	Ec 24	7	*a* 14	12	8	17	0	22	7	27	*d* 8
3	26	8		13	9	18	8	23	0	28	8
4	31	9		14	0	19	0	24	0	29	9
5	34	10	10	15	0	20	8	25	0	30	9
										31	9

Mean: 29 days=9.4.

a=Passage of an average-sized group through the central meridian.
b=Passage of a large group or spot through the central meridian.
c=New formation of a center of activity: E, on the eastern part of the sun's disk; W, on the western part; M, in the central zone.
d=Entrance of a large or averaged-sized center of activity on the limb.

AEROLOGICAL OBSERVATIONS

[The Aerological Division, W. R. Gregg, in charge]

By L. T. SAMUELS

A new airplane observation station was established by the Weather Bureau at Atlanta for the fiscal year 1933 in addition to continuing the four stations already in operation. However, owing to delays in awarding the new contracts, regular flights were not started at the different stations until various times after July 1. In the cases of Atlanta, Chicago, and Omaha, the period of record was too short to provide representative monthly means.

At most stations shown in Table 1 the free-air temperatures were above normal. At San Diego negative departures obtained at all levels. Relative humidities averaged mostly below normal except at Dallas and Ellendale where positive departures predominated.

Free-air resultant wind velocities averaged above normal at most stations with the largest departures in the northern and eastern sections of the country. Resultant wind directions did not differ appreciably from normal.

TABLE 1.—*Free-air temperatures and relative humidities during July, 1932*

[Weather Bureau airplane observations made near 5 A. M. (E. S. T.); Navy observations near 7 A. M. (E. S. T.)]

TEMPERATURE (° C.)

Altitude (meters) m. s. l.	Cleveland, Ohio (246 meters) [1]		Dallas, Tex. (146 meters) [2]		Ellendale, N. Dak. (444 meters)		Norfolk, Va. (3 meters) [3]		Pensacola, Fla. (2 meters) [3]		San Diego, Calif. (9 meters) [3]		Washington, D. C. (2 meters) [3]	
	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal
Surface	18.0	[4]	25.5	−1.0	21.3	+0.3	25.0	−0.8	26.8	+0.5	19.6	−2.8	24.5	−0.6
500	20.3	−1.9	27.7	+3.4	21.0	+0.4	23.9	−0.7	25.9	+1.3	15.5	−3.7	23.1	+0.6
1,000	18.8	0.0	25.3	+3.3	18.9	+0.9	22.1	−0.4	23.2	+1.1	21.4	−1.5	21.4	+1.1
1,500	16.2	+0.6	21.3	+2.1	16.7	+1.1								
2,000	13.5	+0.8	17.4	+1.0	14.0	+1.1	16.4	+0.1	17.1	+1.1	20.0	−0.8	16.9	+2.4
2,500	10.7	+0.8	14.0	+0.6	11.8	+1.8								
3,000	8.0	+0.8	10.9	+0.5	9.2	+2.1	10.6	−0.2	11.3	+1.3	12.4	−0.4	11.3	+2.5
4,000	1.7	0.0	5.0	+0.6	3.3	+1.9			5.9	+1.5			6.2	+3.0
5,000	−4.9	−1.7	−1.1	−1.0	−3.2	+0.4								

RELATIVE HUMIDITY (PER CENT)

Surface	82	[4]	77	+1	68	−1	74	0	81	−4	76	+4	67	−3
500	68	+5	66	−11	68	0	70	+4	73	−6	86	+8	63	−3
1,000	63	−3	62	−5	64	+2	62	+2	72	−1	42	−4	61	−1
1,500	63	−2	66	+4	60	+2								
2,000	57	−4	69	+10	59	+4	54	−4	68	0	27	−4	56	−6
2,500	49	−6	67	+9	54	+1								
3,000	42	−9	61	+4	53	+2	45	−4	58	−5	29	−9	54	−2
4,000	38	−3	57	−2	49	−1			53	−4			45	−4
5,000	33	−16	56	+20	49	+5								

[1] Covers period July 12 to 31, inclusive, only. Temperature and humidity departures based on normals of Royal Center, Ind.
[2] Covers period July 11 to 31, inclusive, only. Temperature departures based on normals determined by interpolating latitudinally between those of Groesbeck, Tex., and Broken Arrow, Okla. Humidity departures based on normals of Groesbeck, Tex.
[3] Naval air stations.
[4] Surface departures omitted because of difference in time between airplane observations and those of kites upon which the normals are based.

TABLE 2.—*Free-air resultant winds (meters per second) based on pilot balloon observations made near 7 a. m. (E. S. T.) during July, 1932*

[Wind from North=360°; East=90°; etc.]

Altitude (meters) m. s. l.	Albuquerque N. Mex. (1,528 meters)		Atlanta, Ga. (309 meters)		Bismark, N. Dak. (518 meters)		Brownsville, Tex. (12 meters)		Burlington, Vt. (132 meters		Cheyenne, Wyo. (1,873 meters)		Chicago, Ill. (198 meters)		Cleveland, Ohio (245 meters)		Dallas, Tex. (154 meters)		Havre, Mont. (762 meters)		Jacksonville, Fla. 14 meters)		Key West, Fla. (11 meters)	
	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity
	°		°		°		°		°		°		°		°		°		°		°		°	
Surface	55	0.6	299	1.0	81	0.6	152	1.5	213	1.6	283	2.9	219	1.0	223	1.8	167	1.9	7	0.3	238	1.6	122	1.9
500			311	3.3			170	9.0	248	3.7			273	5.2	273	5.6	209	9.4			263	7.3	120	3.6
1,000			316	3.9	203	4.3	168	9.2	288	4.8			301	5.8	291	7.6	206	8.2	239	1.1	265	6.0	126	4.2
1,500			306	3.9	241	3.8	161	8.0	287	7.4			305	6.4	295	8.8	200	6.2	272	2.7	271	4.2	118	4.0
2,000	145	0.8	302	3.4	273	5.1	152	7.0	284	8.6	273	3.6	312	7.5	296	9.7	193	4.7	272	4.4	268	3.5	114	4.5
2,500	207	1.7	295	3.9	275	6.0	138	6.4	288	9.2	255	4.0	314	8.0	298	11.2	188	3.7	261	5.6	263	3.1	110	4.4
3,000	228	1.9	296	4.4	279	7.5	126	5.8	289	10.7	266	5.0	310	9.9	297	12.3	172	2.9	255	6.6	254	2.7	105	4.6
4,000	247	0.9	314	3.2	288	11.6	115	5.7	305	15.0	273	5.8	306	10.5	299	13.4	143	2.5	252	10.6	277	2.2	96	4.4
5,000	25	0.9	354	3.2			103	6.4			269	7.9			308	17.8	68	1.2	251	13.0	353	1.0	94	5.2

	Los Angeles, Calif. (217 meters)		Medford, Oreg. (410 meters)		Memphis, Tenn. (85 meters)		New Orleans, La. (25 meters)		Oakland, Calif. (8 meters)		Oklahoma City, Okla. (402 meters)		Omaha, Nebr. (306 meters)		Phoenix, Ariz. (356 meters)		Salt Lake City, Utah (1,294 meters)		Sault Ste. Marie, Mich. (198 meters)		Seattle, Wash. (14 meters)		Washington, D. C. (10 meters)	
	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity
	°		°		°		°		°		°		°		°		°		°		°		°	
Surface	44	0.3	307	0.7	210	0.5	242	0.9	251	1.4	180	4.2	150	1.3	110	0.6	149	2.8	328	0.8	173	1.3	307	0.9
500	124	0.9	300	1.3	271	2.7	235	3.1	296	3.6	195	6.8	188	4.1	220	1.3			320	1.9	192	1.9	309	6.3
1,000	99	1.1	296	1.9	272	3.4	204	3.2	319	7.2	218	11.6	234	5.8	268	2.2			326	3.9	217	2.5	316	8.0
1,500	194	0.8	265	0.7	285	3.6	193	2.3	312	4.8	221	8.1	252	4.8	276	2.2	161	5.0	319	6.8	217	2.8	307	9.6
2,000	179	2.9	259	0.8	281	2.7	169	1.4	291	4.6	212	6.0	262	5.9	265	2.6	181	5.0	315	9.7	234	3.9	302	11.5
2,500	190	3.5	232	4.4	296	3.1	127	1.3	244	6.2	213	4.1	269	6.3	214	1.4	206	4.1	316	11.1	267	4.4	298	11.0
3,000	212	4.2	232	6.6	308	3.0	114	1.0			190	2.0	273	6.1	192	2.5	230	4.6	317	11.8	265	7.3	291	12.8
4,000			229	7.7	275	3.3	70	1.6			159	2.8	290	6.6	162	2.4	248	5.7	325	10.4			303	10.9
5,000													276	6.1			231	4.2						

RIVERS AND FLOODS

By RICHMOND T. ZOCH

[River and Flood Division, Montrose W. Hayes in charge]

Floods, which were mostly local in character, occurred in July in the Mississippi drainage area, and in the Gulf States, as shown in the table below.

Numerous floods were reported in creeks and small rivers, where it is impracticable to maintain a flood forecasting service. The most noteworthy of these was in the Paint and Armstrong Creeks of West Virginia, where damage to the extent of $2,500,000 was done and 18 lives were lost. Another occurred in the Santa Cruz River, and inundated Nogales, Ariz., causing damage to the extent of $75,000.

A moderate rise in the Coosa River in Alabama caused a break in Dam No. 5. No damage, aside from the breaking of the dam, was reported. One life was lost in the floods in Kansas.

Table of flood stages in July, 1932

[All dates in July unless otherwise specified]

River and station	Flood stage	Above flood stages—dates		Crest	
		From—	To—	Stage	Date
EAST GULF OF MEXICO DRAINAGE					
Tombigbee:	*Feet*			*Feet*	
Aberdeen, Miss.	34	9	10	36.3	9
Lock 3	33	9	13	35.1	12
MISSISSIPPI SYSTEM					
Upper Mississippi Basin					
Des Moines: Ottumwa, Iowa	9	9	10	9.5	10
Missouri Basin					
Grand: Brunswick, Mo.	12	7	9	12.8	7–8
Osage:					
Quenemo, Kans.	30	5	7	35.2	6
Ottawa, Kans.	24	6	8	27.2	8
Missouri: Waverly, Mo.	23	7	7	23.0	7
Ohio Basin					
Elk: Clay, W. Va.	18	4	6	26.5	4
Arkansas Basin					
Fountain: Fountain, Colo.	8	29	29	8.6	29
Cimarron: Perkins, Okla.	11	1	1	11.5	1
Cottonwood:					
Elmdale, Kans.	32	6	7	33.57	5
Emporia, Kans.	20	7	10	22.8	9
Neosho:					
Neosho Rapids, Kans.	22	6	8	28.0	6
Le Roy, Kans.	18	7	11	25.5	9–10
Iola, Kans.	15	10	12	16.2	11
Chanute, Kans.	20	12	12	20.5	12
Oswego, Kans.	17	13	13	17.0	13
Arkansas: Great Bend, Kans.	5	7	7	5.2	7
Red Basin					
Sulphur: Ringo Crossing, Tex.	20	7	12	22.0	10
Lower Mississippi Basin					
Tallahatchie: Swan Lake, Miss.	24	13	22	26.0	18
WEST GULF OF MEXICO DRAINAGE					
Trinity: Dallas, Tex.	28	8	9	29.9	8
Guadalupe:					
New Braunfels, Tex.	20	2	4	33.5	3
Gonzales, Tex.	17	5	7	30.4	5
Victoria, Tex.	21	8	10	24.0	9
Nueces:					
Cotulla, Tex.	15	6	11	24.4	8
Three Rivers, Tex.	35	7	11	43.8	8
GULF OF CALIFORNIA DRAINAGE					
Colorado: Parker, Ariz.	7	May 1	(1)	12.0	May 30-31
PACIFIC SLOPE DRAINAGE					
Columbia Basin					
Columbia:					
Marcus, Wash.	24	May 7	(1)	35.0	June 18,19,26, 27.
Vancouver, Wash.	15	May 10	8	21.6	May 25

[1] Continued into August.

Statement of flood losses

EAST GULF OF MEXICO DRAINAGE

TOMBIGBEE RIVER IN MISSISSIPPI AND ALABAMA

Prospective crops	$4,000

MISSISSIPPI SYSTEM

Upper Mississippi Basin

DES MOINES RIVER IN IOWA

Tangible property totally or partially destroyed	$10,000

Missouri Basin

OSAGE RIVER IN KANSAS

Tangible property totally or partially destroyed	14,000
Matured crops	45,000
Prospective crops	22,000
Livestock and other movable property	2,000

Arkansas Basin

FOUNTAIN RIVER IN COLORADO

Tangible property totally or partially destroyed	7,500
Prospective crops	200,000

CIMARRON RIVER IN OKLAHOMA

Tangible property totally or partially destroyed	50
Prospective crops	1,350

COTTONWOOD AND NEOSHO RIVERS IN KANSAS

Tangible property totally or partially destroyed	25,000
Matured crops	93,500
Prospective crops	363,950
Livestock and other movable property	16,500
Suspension of business, including wages of employees	14,000

Lower Mississippi Basin

TALLAHATCHIE RIVER IN MISSISSIPPI

Prospective crops	20,000

WEST GULF OF MEXICO DRAINAGE

GUADALUPE RIVER IN TEXAS

Tangible property totally or partially destroyed	$195,000
Matured crops	12,000
Prospective crops	25,000
Livestock and other movable property	8,000

NEUCES RIVER IN TEXAS

Tangible property totally or partially destroyed	380,000
Matured crops	85,000
Prospective crops	65,000
Livestock and other movable property	18,000

ESTIMATED VALUE OF PROPERTY SAVED BY WARNINGS

Tombigbee River in Mississippi and Alabama	$15,000
Osage River in Kansas	5,000
Missouri River in Missouri	500
Cottonwood and Neosho Rivers in Kansas	85,000
Sulphur River in Louisiana	4,000
Tallahatchie River in Mississippi	1,000
Guadalupe River in Texas	42,750
Neuces River in Texas	37,800

WEATHER OF THE ATLANTIC AND PACIFIC OCEANS

[The Marine Division, W. F. McDonald in charge]

NORTH ATLANTIC OCEAN

By F. A. YOUNG

Atmospheric pressure.—The North Atlantic HIGH was well developed during July with the exception of the first three and last five days, while the Icelandic LOW was somewhat more active than usual, except for brief periods when the pressure was slightly above normal.

While there were a number of low-pressure areas over the northern steamer lanes, they were, as a rule, of comparatively slight intensity, and moderate conditions with slight pressure gradients prevailed over the ocean south of the 50th parallel during the greater portion of the month.

TABLE 1.—*Averages, departures, and extremes of atmospheric pressure (sea level) at selected stations for the North Atlantic Ocean and its shores, July, 1932*

Stations	Average pressure	Departure	Highest	Date	Lowest	Date
	Inches	*Inch*	*Inches*		*Inches*	
Julianehaab, Greenland	29.99	------	30.24	19	29.59	7
Reykjavik, Iceland	29.73	−0.11	30.14	17	29.02	2
Lerwick, Shetland Islands	29.76	−0.04	30.14	12	29.31	1
Valencia, Ireland	29.91	−0.07	30.33	19	29.27	1
Lisbon, Portugal	30.03	+0.01	30.16	20, 21	29.91	15
Madeira	30.08	+0.03	30.17	13	29.97	24
Horta, Azores	30.33	+0.06	30.50	22	29.97	29
Belle Isle, Newfoundland	29.74	−0.13	30.08	9	29.18	4
Halifax, Nova Scotia	29.78	−0.17	30.04	26	29.28	3
Nantucket	29.82	−0.16	30.05	26	29.25	2
Hatteras	29.93	−0.08	30.17	10	29.52	2
Bermuda	30.03	−0.15	30.16	27, 28	29.80	2
Turks Island	30.03	−0.04	30.10	5, 6	29.96	17
Key West	30.01	−0.02	30.14	6	29.88	17
New Orleans	29.99	−0.01	30.16	6	29.79	17
Cape Gracias, Nicaragua	29.89	−0.02	29.92	5, 20	29.84	18, 28

NOTE.—All data based on a. m. observations only, with departures compiled from best available normals related to time of observations except Nantucket, Hatteras, Key West, and New Orleans, which are 24-hour corrected means.

Cyclones and gales.—July was another unusually quiet month over the North Atlantic Ocean. Gale reports have been received from only 10 vessels, the highest force of the wind being 9, and all occurred prior to the 20th. See table of Ocean Gales and Storms.

Fog.—Fog was again unusually prevalent over the western section of the ocean, and the number of days on which it was reported in different localities is as follows: Over the Grand Banks, from 18 to 25 days; west of the fiftieth meridian, between the fortieth and forty-fifth parallels, from 15 to 17 days; along the American coast between the thirty-fifth and fortieth parallels, on 3 days; along the northern steamer lanes, east of the forty-fifth parallel, from 3 to 12 days.

Transatlantic aviation.—James Mattern and Bennett Griffin left New York for Harbor Grace, Newfoundland at 4 a. m. (E. S. T.) July 5. They took off from Harbor Grace at 5.02 p. m. on the same day, making a successful crossing, and were sighted over Ireland 11½ hours later, on July 6. Charts VIII and IX show the conditions on the 5th and 6th, respectively.

OCEAN GALES AND STORMS, JULY, 1932

Vessel	Voyage From—	Voyage To—	Position at time of lowest barometer Latitude	Position at time of lowest barometer Longitude	Gale began	Time of lowest barometer	Gale ended	Lowest barometer	Direction of wind when gale began	Direction and force of wind at time of lowest barometer	Direction of wind when gale ended	Direction and highest force of wind	Shifts of wind near time of lowest barometer
NORTH ATLANTIC OCEAN			° ′	° ′				*Inches*					
U. S. Lightship No. 80	Anchored on Lookout Shoals.		34 18 N	76 24 W	July 1	8p., 1	July 2	29.73	SW	SW, 8	W	—, 8	SW–W.
Henri Jaspar, Belg. S. S.	Antwerp	New York	50 14 N	3 40 W	do	1a., 1	July 1	29.33	SSW	SSW, 8	W	SSW, 8	SSW–W.
Afoundria, Am. S. S.	Mobile	Liverpool	39 18 N	63 00 W	July 2	7a., 2	July 3	29.60	S	S, 7	SSW	SSW, 9	
Exmouth, Am. S. S.	Casablanca	New York	40 38 N	56 27 W	do	10a., 3	do	29.70	S	S, 8	SSW	S, 9	S–SW.
Rochambeau, Fr. S. S.	Havre	do	50 45 N	22 30 W	July 3	8a., 3	July 4	29.35	NNW	NNW, 8	W	NNW, 8	WSW–NNW.
Berlin, Ger. S. S.	English Channel.	do	49 42 N	18 34 W	do	4p., 3	do	29.26	SSW	WNW, 8	NW	WNW, 9	SW–NW.
American Banker, Am. S. S.	London	do	45 08 N	40 40 W	July 7	2p., 7	July 7	29.79	SSW	SW, —	NW	SSW, 8	SW–NNW.
Lord Kelvin, Br. Cable S. S.	Halifax	Cable Grounds.	50 29 N	32 40 W	July 11	Noon, 11	July 11	29.96	SSE	S, 8	SW	S, 8	Steady.
Bergensfjord, Nor. S. S.	New York	Bergen	60 00 N	4 30 E	July 17	4a., 18	July 18	29.56	N	N, 9	N	N, 9	Do.
Astrida, Am. S. S.	Pernambuco	Antwerp	38 15 N	13 35 W	July 18	4a., 19	July 20		N	N, 8	N	N, 8	Do.
NORTH PACIFIC OCEAN													
Takaoka Maru, Jap. S. S.	Yokohama	San Francisco	38 50 N	125 00 W	July 4	8a., 5	July 5	30.00	N	NW, —	NW	N, 8	
President Taft, Am. S. S.	do	Victoria	49 45 N	168 50 W	July 7	4p., 7	July 8	30.10	SSE	SE, 6	S	S, 8	SSE–S.
Nevada, Am. S. S.	Hong Kong	San Francisco	23 45 N	118 15 E	July 28	9p., 28	July 29	28.96	NNW	Calm	SE	N, 10	NNW–N–SE.
SOUTH PACIFIC OCEAN													
West Cusseta, Am. M. S.	Long Beach	Cape Town	56 08 S	76 00 W	July 7	8a., 7	July 8	29.11	SSE	SSE, 10	S	SSE, 10	Steady.
SOUTH ATLANTIC OCEAN													
Siljestad, Nor. M. S.	Gulong, Australia.	Las Palmas	34 08 S	18 05 E	July 2	6p., 2	July 3	29.86	NW	NW, 10	NW	NW, 11	Steady.
West Cusseta, Am. M. S.	Long Beach	Cape Town	42 56 S	31 05 W	July 16	8a., 16	July 16	29.51	WNW	W, 10	SW	WSW, 10	W–WSW.
Do	do	do	41 10 S	12 52 W	July 19	2p., 19	July 19	29.82	N	NNW, 9	NW	NNW, 9	NNW–NW.
INDIAN OCEAN													
City of Rayville, Am. M. S.	Colombo	New York	12 30 N	54 30 E	July 7	4p., 9	July 10	29.48	SW	SW, 8	S	SW, 9	Steady.

NORTH PACIFIC OCEAN, JULY, 1932

By WILLIS E. HURD

Atmospheric pressure.—The July pressure situation on the North Pacific Ocean changed little from that of June. Moderately low pressure dominated the Gulf of Alaska, where the average was about a tenth of an inch below normal, and pressures were also low over the Philippines and the China Sea.

The greater part of the ocean, however, was under the influence of a great anticyclone which extended from the American coast far into east longitudes.

TABLE 1.—*Averages, departures, and extremes of atmospheric pressure at sea level, North Pacific Ocean, July, 1932, at selected stations*

Stations	Average pressure	Departure from normal	Highest	Date	Lowest	Date
	Inches	*Inch*	*Inches*		*Inches*	
Point Barrow	29.98	+0.06	30.32	7	29.54	30
Dutch Harbor	29.99	+0.05	30.48	7	29.54	15
St. Paul	29.93	+0.09	30.48	6,7	29.42	15
Kodiak	29.88	−0.06	30.30	6,7	29.54	11
Juneau	29.93	−0.12	30.28	6	29.52	12
Tatoosh Island	30.04	−0.01	30.32	6	29.58	9
San Francisco	29.94	−0.01	30.17	13	29.70	3
Mazatlan	29.87	−0.06	29.94	7, 15, 16	29.82	3, 26
Honolulu	30.03	+0.01	30.10	20	29.91	4
Midway Island	30.10	−0.01	30.20	20	29.94	10
Guam	29.80	−0.04	29.86	11, 17	29.72	20
Manila	29.73	−0.07	29.82	16	29.60	25
Naha	29.77	+0.05	29.92	22	29.08	31
Chichishima	29.90	+0.05	30.00	9	29.74	12
Nemuro	29.83	----------	30.06	10, 15	29.62	2

NOTE.—Data based on 1 daily observation only, except for Juneau, Tatoosh Island, San Francisco, and Honolulu, which are based on 2 observations. Departures are computed from best available normals related to time of observation.

Cyclones and gales.—The month was remarkably free from gales. Except for unimportant depressions that moved mainly to the northward of the forty-fifth and fiftieth parallels, no noteworthy oceanic cyclones occurred outside of Asiatic waters, where there were several of tropical origin.

For the entire ocean east of the longitude of Japan only two gales of force as high as 8 were reported, and both were of anticyclonic origin.

In the Mexican Tropics the only disturbances reported were those due to severe thunderstorms.

Typhoons and other far eastern depressions.—At least three well-defined disturbances affected the China Seas. One appeared east of Luzon on the 19th. It crossed the upper part of the island and on the 22d was moving westward toward Indo-China. There are no details as to its intensity, except that Hong Kong Observatory reported moderate easterly gales at G. M. N. of the 21st and 22d.

The second probably originated between Yap and the Philippines about the 24th. It moved northwest across Basco Strait and on the 28th crossed the China coast west of Taiwan. The American steamship *Nevada* encountered, as indicated in the table, the calm center of this storm, with a corrected pressure reading of 28.96 inches, but highest wind was only of force 10, from the north, preceding the center.

The third cyclone, undoubtedly the severest of the three, began at the end of July, but its greatest reported intensity occurred on August 2, when the *Nevada*, previously mentioned, ran into its hurricane winds west of Kiushu Island. The typhoon first appeared about July 29 near 18° N., 130° E., moved north across the North China and Yellow Seas, thence northeast across northern Chosen into the Japan Sea, and entered the continent on August 6.

Fog.—Fog was reported on 8 to 10 or more days along the northern steamship routes west of longitude 160° W., and on 2 to 6 days to the eastward. It occurred on at least 16 days along the California coast and on 5 days off Lower California. It was also noted on 3 to 5 days in the Yellow and Japan Seas.

CLIMATOLOGICAL TABLES

CONDENSED CLIMATOLOGICAL SUMMARY

In the following table are given for the various sections of the climatological service of the Weather Bureau the monthly average temperature and total rainfall; the stations reporting the highest and lowest temperatures, with dates of occurrence; the stations reporting the greatest and least total precipitation; and other data as indicated by the several headings.

The mean temperature for each section, the highest and lowest temperatures, the average precipitation, and the greatest and least monthly amounts are found by using all trustworthy records available.

The mean departures from normal temperatures and precipitation are based only on records from stations that have 10 or more years of observations. Of course, the number of such records is smaller than the total number of stations.

Condensed climatological summary of temperature and precipitation by sections, July, 1932

[For description of tables and charts, see REVIEW, January, p. 37]

Section	Temperature							Precipitation					
	Section average	Departure from the normal	Monthly extremes					Section average	Departure from the normal	Greatest monthly		Least monthly	
			Station	Highest	Date	Station	Lowest / Date			Station	Amount	Station	Amount
	°F.	°F.		°F.			°F.	In.	In.		In.		In.
Alabama	82.9	+2.7	Eufaula	105	22	Riverton	54 4	4.83	−0.54	Milltown	10.12	Union Springs	1.27
Arizona	81.4	−0.3	Fort Mojave	120	2	3 stations	38 [1] 6	2.67	+0.35	Canille	9.76	Parker	0.00
Arkansas	82.5	+2.3	Corning	108	16	Dutton	50 2	5.00	+1.25	Thornburg	12.31	Fort Smith	1.67
California	71.3	−1.7	Greenland Ranch	121	7	Gem Lake	22 13	0.04	−0.03	Kingston	0.69	164 stations	0.00
Colorado	69.5	+2.4	Las Animas	107	21	Pearl	20 5	2.25	−0.04	Wray	8.31	Long Branch	0.25
Florida	83.6	+2.3	2 stations	106	[1] 14	Belle Glade	64 17	3.62	−3.45	Hilliard	10.21	Hypoluxo	0.14
Georgia	82.9	+3.0	Millen	108	[1] 14	Clayton	45 3	5.07	−0.68	Thomasville	9.21	Double Branches	1.25
Idaho	66.8	−1.6	Pete King Ranger Station	107	22	2 stations	25 [1] 4	0.91	+0.31	Ashton	4.07	Nezperce	0.00
Illinois	77.3	+1.2	Sparta	105	[1] 19	Mount Carroll	46 2	3.35	+0.08	Monmouth	6.87	Charleston	1.64
Indiana	76.4	+1.1	2 stations	105	[1] 15	2 stations	46 [1] 12	3.48	+0.10	Vevay (near)	6.34	Bedford	1.53
Iowa	75.8	+2.0	Inwood (near)	106	27	Boone (near)	40 2	3.12	−0.62	Fairfield	6.30	Sioux Center	0.95
Kansas	81.6	+3.4	Lincoln	110	15	Oketo	50 2	3.12	−0.24	Council Grove	11.27	Richfield	0.33
Kentucky	78.5	+1.7	Williamsburg	103	20	Farmers	49 [1] 4	4.31	+0.17	Berea	8.82	Rumsey	1.95
Louisiana	84.3	+2.6	2 stations	107	[1] 15	Bogalusa	63 22	4.59	−1.53	Cinclare	10.70	Logansport	0.22
Maryland-Delaware	74.8	−0.4	Frederick, Md	99	22	2 stations	41 [1] 25	3.03	−1.21	Friendsville, Md	5.93	Wilmington, Del. (Reservoir).	1.55
Michigan	69.0	+0.3	Monroe	101	21	Wolverine	32 3	3.94	+1.09	Painesdale	9.40	Wellston	1.54
Minnesota	70.8	+1.8	Beardsley	106	19	Cloquet	32 4	2.90	−0.55	Grand Marais	6.04	Itasca State Park	1.25
Mississippi	83.8	+2.8	Columbia	105	[1] 14	2 Stations	61 [1] 3	5.40	+0.37	Magnolia	10.95	Enterprise	1.79
Missouri	79.8	+2.5	2 stations	109	[1] 16	do	48 2	3.63	−0.37	Gorin	8.07	Marble Hill	0.52
Montana	67.9	+1.2	Savage	107	17	do	28 5	1.35	−0.22	Dillon	3.02	Lonepine	0.18
Nebraska	77.6	+2.9	McCook	114	20	Harrison	40 10	2.80	−0.54	Utica	12.83	Chadron	0.43
Nevada	72.7	−0.9	2 stations	116	7	2 stations	30 [1] 4	0.43	+0.05	Lamoille	1.56	16 stations	0.00
New England	67.7	−1.3	Turners Falls, Mass.	96	27	Bennington, Vt	34 30	3.92	+0.18	West Burke, Vt	8.76	Nantucket, Mass	0.66
New Jersey	73.8	+0.3	Camden	98	1	Long Valley	41 25	2.76	−1.87	Sussex	5.54	Jersey City	0.82
New Mexico	72.7	+0.8	2 stations	108	[1] 5	Elizabethtown	35 5	2.59	−0.27	Kingston	6.23	2 stations	0.20
New York	67.7	−1.8	Cairo	96	13	2 stations	37 5	4.65	+0.72	Big Moose	9.76	New York City	0.85
North Carolina	79.0	+2.1	Goldsboro	108	22	Mount Mitchell	39 3	2.81	−2.96	Hendersonville	7.35	Hickory	0.69
North Dakota	70.0	+1.6	Max	108	17	Hansboro	36 [1] 1	2.01	−0.41	Dunseith	5.95	Bowman	0.68
Ohio	73.8	+0.4	Findlay	104	19	Millport	43 31	4.29	+0.48	Peebles	8.91	Pleasant Hill	1.61
Oklahoma	83.2	+1.7	Carnegie	108	29	5 stations	56 [1] 2	2.64	−0.43	Cleveland	10.15	Hooker	0.11
Oregon	64.1	−2.3	6 stations	102	[1] 21	Fremont	20 4	0.33	−0.09	Astoria	2.48	11 stations	0.00
Pennsylvania	72.0	0.0	4 stations	100	[1] 1	Kane	36 3	3.39	−0.90	Confluence	9.65	Sunbury	0.85
South Carolina	82.6	+2.7	Society Hill	108	22	2 stations	49 3	3.74	−2.07	Florence (No. 1)	9.76	Orangeburg	0.33
South Dakota	75.0	+2.8	3 stations	110	19	4 stations	41 [1] 1	1.85	−0.87	Spearfish	5.95	Huron	0.15
Tennessee	80.1	+2.6	Etowah	103	21	Elkmont	40 3	4.80	+0.41	Savannah	9.34	Rogersville	1.11
Texas	83.9	+0.9	McCamey	112	31	Romero	53 2	2.42	−0.18	Uvalde	21.01	7 stations	0.00
Utah	70.9	−0.3	St. George	108	[1] 6	2 stations	28 [1] 5	1.42	+0.45	Escalante	5.41	Sevier Bridge Dam	T.
Virginia	76.7	+1.2	Kenbridge	105	[1] 20	Emory	45 3	2.86	−1.74	Damascus	5.43	Buchanan	0.44
Washington	62.7	−3.6	Wawawai	105	21	Paradise Inn	28 [1] 2	1.52	+0.83	Big Four	10.86	4 stations	0.00
West Virginia	73.1	+0.2	Parsons	102	20	Bayard	40 [1] 25	6.02	+1.56	Clay	15.56	Union	1.01
Wisconsin	70.9	+1.5	Amery	103	20	Long Lake	31 4	2.95	−0.77	Viroqua	5.11	Plum Island	0.58
Wyoming	66.5	+1.3	5 stations	100	[1] 8	2 stations	22 5	0.98	−0.43	Bechler River	3.99	Thermopolis	0.00
Alaska (June)	50.3	−2.7	Fairbanks (near)	83	21	Dillingham	21 5	2.39	+0.74	Annex Creek	14.54	Talkeetna	0.00
Hawaii	73.9	−0.3	Haiku	95	4	Kanalohuluhulu	43 21	6.37	+0.26	Puohakmoa (No. 2)	40.00	5 stations	0.00
Puerto Rico	78.6	−0.4	Mayaguez	96	14	Guineo Reservoir	51 1	6.15	−0.60	Coloso	13.95	Santa Rita	0.00

[1] Other dates also.

TABLE I.—*Climatological data for Weather Bureau stations, July, 1932*

District and station	Elevation of instruments: Barometer above sea level	Elevation of instruments: Thermometer above ground	Elevation of instruments: Anemometer above ground	Pressure: Station, reduced to mean of 24 hours	Pressure: Sea level, reduced to mean of 24 hours	Pressure: Departure from normal	Temperature of the air: Mean max. + mean min. ÷ 2	Temperature of the air: Departure from normal	Temperature of the air: Maximum	Temperature of the air: Date	Temperature of the air: Mean maximum	Temperature of the air: Minimum	Temperature of the air: Date	Temperature of the air: Mean minimum	Temperature of the air: Greatest daily range	Mean wet thermometer	Mean temperature of the dewpoint	Mean relative humidity	Precipitation: Total	Precipitation: Departure from normal	Precipitation: Days with .01, or more	Wind: Total movement	Wind: Prevailing direction	Wind: Maximum velocity: Miles per hour	Wind: Maximum velocity: Direction	Wind: Maximum velocity: Date	Clear days	Partly cloudy days	Cloudy days	Average cloudiness, tenths	Total snowfall	Snow, sleet, and ice on ground at end of month
	Ft.	*Ft.*	*Ft.*	*In.*	*In.*	*In.*	°F.	°F.	°F.		°F.	°F.		°F.	°F.	°F.	°F.	%	*In.*	*In.*		*Miles*								*0–10*	*In.*	*In.*
New England							68.3	−0.6										72	3.63	+0.2										4.9		
Eastport	76	67	85	29.69	29.77	−0.16	59.6	−0.8	79	25	68	48	16	52	24	56	54	83	3.64	+0.6	16	6,351	s.	27	e.	8	4	9	18	7.3	0.0	0.0
Greenville, Me	1,070	6		28.63	29.76		62.6		85	26	72	39	16	53	36				3.44		21	3,969	nw.	16		3	8	9	14		0.0	0.0
Portland, Me	103	82	117	29.67	29.79	−.16	68.2	+0.1	89	10	76	51	31	60	26	60	55	67	3.71	+0.5	18	6,668	s.	27	nw.	31	17	8	6	4.2	0.0	0.0
Concord	289	70	79	29.49	29.79	−.17	66.8	−1.7	88	26	79	41	31	55	36				1.43	−2.1	13	4,423	nw.	18	w.	3	13	11	7	4.4	0.0	0.0
Burlington	403	11	48	29.36	29.79	−.15	66.4	−3.9	85	26	75	49	16	58	29				8.08	+4.6	19	6,552	s.	29	se.	1	7	7	17	6.3	0.0	0.0
Northfield	876	12	60		29.81	−.13	63.0	−2.9	85	26	75	41	16	51	37			76	4.39	+0.8	17	5,190	s.	23	sw.	7	7	13	11	6.4	0.0	0.0
Boston	125	106	165	29.67	29.80	−.16	72.8	+1.1	90	10	82	57	5	64	27	63	57	62	2.10	−1.4	9	5,566	sw.	21	nw.	11	16	8	7	4.5	0.0	0.0
Nantucket	12	14	90	29.81	29.82	−.16	69.4	+1.6	81	25	76	56	16	63	18	64	61	79	0.66	−2.2	5	9,503	sw.	30	s.	4	18	8	5	4.0	0.0	0.0
Block Island	26	11	46	29.80	29.83	−.14	68.8	+0.4	82	21	75	59	5	63	19	64	62	83	6.71	+3.6	8	9,774	w.	30	sw.	27	18	9	4	3.9	0.0	0.0
Providence	160	215	251	29.65	29.82	−.15	71.4	−2.0	88	10	81	55	16	62	25	63	57	63	2.83	−0.4	10	8,502	nw.	38	nw.	9	18	8	5	3.6	0.0	0.0
Hartford	159	122		29.66	29.83	−.14	71.9	+0.3	88	10	82	54	16	62	28				3.64	−0.7	10		sw.				14	12	5	4.4	0.0	0.0
New Haven	106	74	153	29.73	29.84	−.13	72.5	+0.7	90	10	82	58	31	64	24	64	60	65	2.79	−1.5	8	6,505	s.	24	n.	23	13	14	4	4.4	0.0	0.0
Middle Atlantic States							75.2	+0.2										66	2.76	−1.6										5.0		
Albany	97	107	115	29.72	29.82	−.14	70.8	−1.8	91	13	81	52	5	61	32	62	57	65	4.66	+1.2	11	5,502	s.	21	s.	1	7	20	4	4.7	0.0	0.0
Binghamton	871	60	68	28.95	29.86	−.11	68.5	−1.5	91	13	79	47	16	58	35				5.29	+1.6	11	4,485	nw.	22	w.	1	3	9	19	7.6	0.0	0.0
New York	314	414	454	29.51	29.84	−.14	73.9	+0.1	88	1	82	58	5	66	22	65	60	65	0.85	−3.4	7	10,365	nw.	50	nw.	2	10	17	4	4.5	0.0	0.0
Bellefonte	1,050	5	42	28.80	29.88		69.2		92	19	82	44	5	56	39	63	59	72	3.64		12		sw.	45	sw.	27	11	10	10	5.6	0.0	0.0
Harrisburg	374	94	104	29.47	29.86	−.12	74.9	+0.1	95	19	85	57	3	65	29	64	59	62	2.46	−1.4	8	5,609	w.	30	ne.	20	12	15	4	4.5	0.0	0.0
Philadelphia	114	123	367	29.75	29.87	−.11	77.3	+1.1	93	1	86	62	5	69	21	66	60	59	2.25	−1.9	8	8,858	sw.	38	n.	22	12	12	7	4.6	0.0	0.0
Reading	325	81	103	29.52	29.86	−.12	75.0	−0.5	95	19	85	57	25	65	30	65	59	60	4.23	0.0	8	4,937	nw.	26	sw.	27	9	14	8	5.2	0.0	0.0
Scranton	805	72	103	29.05	29.89	−.09	71.0	−0.7	92	1	82	49	25	60	35	62	57	64	2.18	−1.8	9	5,175	sw.	24	nw.	1	3	22	6	5.5	0.0	0.0
Atlantic City	52	37	172	29.81	29.86	−.12	73.6	+1.5	90	11	80	61	3	67	23	67	64	74	4.21	+0.3	9	10,365	s.	50	ne.	17	9	14	8	5.4	0.0	0.0
Sandy Hook	22	10	55	29.82	29.84		74.4		88	10	82	62	5	67	21	66	63	71	0.93	−4.2	8	9,405	w.	37	s.	27	14	13	4	4.1	0.0	0.0
Trenton	190	159	183	29.66	29.86		74.6	+0.1	93	1	84	58	3	65	28	65	60	62	3.63	−0.3	8	7,389	nw.	37	nw.	29	8	15	8	5.2	0.0	0.0
Baltimore	123	100	215	29.74	29.87	−.11	78.3	+1.1	96	13	87	61	3	69	24	67	62	60	2.42	−2.2	10	7,671	sw.	40	nw.	20	14	11	6	4.6	0.0	0.0
Washington	112	62	85	29.77	29.88	−.12	77.4	+0.6	95	13	87	60	3	68	28	67	62	63	2.43	−2.3	7	4,988	nw.	25	nw.	2	17	8	6	4.2	0.0	0.0
Cape Henry	18	8	54	29.88	29.90		78.0	+0.5	94	1	86	61	31	70	23	70	67	73	4.69	−0.7	7	7,427	sw.	29	nw.	2	6	19	6	4.9	0.0	0.0
Lynchburg	681	153	188	29.19	29.92	−.09	79.2	+1.7	101	20	90	58	3	68	37	68	63	62	0.75	−3.5	5	4,887	w.	40	n.	14	12	16	3	4.2	0.0	0.0
Norfolk	91	170	205	29.83	29.92	−.08	79.2	+0.5	96	23	88	62	3	70	25	70	66	69	3.21	−2.5	7	8,187	s.	48	nw.	29	7	17	7	5.1	0.0	0.0
Richmond	144	11	52	29.77	29.91	−.10	79.1	+0.6	100	20	90	58	3	68	32	70	66	69	1.66	−3.1	6	5,706	sw.	33	w.	23	10	16	5	4.4	0.0	0.0
Wytheville	2,304	49	55	27.65	29.94	−.07	72.8	+0.2	92	20	84	51	3	61	35	65	61	70	1.02	−3.0	9	4,851	w.	24	nw.	7	8	17	6	5.3	0.0	0.0
South Atlantic States							82.1	+3.0										72	3.39	−2.4										4.7		
Asheville	2,253	89	104	27.70	29.97	−.05	76.4	+4.7	97	20	88	50	3	64	34	67	64	73	2.74	−1.6	13	4,312	nw.	26	nw.	29	5	21	5	5.5	0.0	0.0
Charlotte	779	55	62	29.13	29.95	−.07	81.6	+3.2	100	14	92	58	3	71	29	71	66	65	3.73	−1.4	10	3,550	sw.	21	ne.	15	9	17	5	5.1	0.0	0.0
Greensboro	886	6	56	29.02	29.95		77.7		99	20	90	52	3	66	36	70	67	74	3.66		11	5,108	sw.	40	n.	14	7	19	5	5.4	0.0	0.0
Hatteras	11	5	50	29.91	29.92	−.09	80.1	+1.9	92	20	86	67	13	74	21	74	71	77	3.13	−2.4	7	8,675	sw.	37	nw.	6	14	11	6	4.5	0.0	0.0
Raleigh	376	103	146	29.54	29.92	−.10	81.6	+2.8	102	20	92	61	3	71	29	70	65	62	1.05	−4.4	6	6,134	sw.	29	n.	29	10	17	4	4.7	0.0	0.0
Wilmington	72	73	106	29.88	29.95	−.06	81.6	+2.5	96	15	90	63	3	73	26	74	72	79	4.28	−2.8	11	6,530	sw.	40	s.	16	13	15	3	4.1	0.0	0.0
Charleston	48	11	92	29.91	29.96	−.07	83.8	+2.4	101	22	92	68	25	76	23	76	74	77	4.03	−2.9	7	7,497	sw.	40	s.	25	10	16	5	4.8	0.0	0.0
Columbia, S. C	351	41	57	29.58	29.95	−.07	83.6	+2.7	102	22	94	63	3	73	29	72	68	67	3.39	−2.0	9	5,269	sw.	30	ne.	29	11	18	2	4.4	0.0	0.0
Greenville, S. C	1,039	139	146	28.89	29.95		81.8	+4.9	100	21	92	60	3	72	27	71	67	67	3.18	−2.2	10	5,846	sw.	30	w.	4	11	16	4	4.5	0.0	0.0
Augusta	182	62	77	29.75	29.94	−.08	84.9	+3.6	104	22	96	65	3	74	30	74	70	68	2.27	−3.1	7	4,336	nw.	29	n.	29	11	17	3	4.5	0.0	0.0
Savannah	65	150	194	29.91	29.98	−.05	84.2	+2.7	100	15	94	69	3	74	27	75	72	76	2.58	−4.1	10	7,988	w.	41	sw.	3	10	16	5	4.6	0.0	0.0
Jacksonville	43	209	245	29.95	30.00	−.03	84.0	+1.9	99	15	92	69	18	75	22	74	72	74	6.92	+0.2	11	7,536	sw.	39	sw.	26	12	16	3	4.2	0.0	0.0
Florida Peninsula							84.4	+2.5										73	1.25	−4.3										4.4		
Key West	22	10	64	29.99	30.01	−.02	84.6	+1.1	93	31	90	70	19	79	21	77	74	72	1.23	−2.0	9	5,606	se.	29	e.	19	10	18	3	4.6	0.0	0.0
Miami	25	124	168	30.00	30.03	−.01	83.8	+2.8	93	8	90	74	16	78	16	76	73	71	0.48	−4.9	5	5,753	se.	21	se.	30	12	11	8	4.6	0.0	0.0
Tampa	35	88	197	29.98	30.01	−.03	84.8	+3.6	97	15	93	70	16	77	22	76	74	75	2.03	−5.9	8	6,112	w.	37	se.	16	8	19	4	4.6	0.0	0.0
Titusville	44	5		29.95	30.00		84.8		100	9	95	71	20	74	25				6.78		9		sw.				17	9	5	3.8	0.0	0.0
East Gulf States							83.2	+2.5										76	4.44	−1.3										5.2		
Atlanta	1,173	190	198	28.78	29.99	−.03	80.6	+2.5	96	15	90	65	3	72	22	72	69	73	2.80	−1.8	10	6,151	w.	27	sw.	4	10	14	7	5.2	0.0	0.0
Macon	370	76	84	29.59	29.97	−.05	83.4	+2.2	102	15	94	66	3	73	27	74	71	72	4.09	−0.6	12	4,581	nw.	24	n.	28	9	10	12	5.5	0.0	0.0
Thomasville	273	49	103	29.71	30.00	−.03	83.2	+1.4	100	13	93	68	10	73	27	75	73	79	9.21	+2.5	16	4,847	sw.	31	nw.	10	10	11	10	5.5	0.0	0.0
Apalachicola	36	11	51	29.96	30.00		84.7		102	14	91	70	16	78	22	78	76	76	3.38	−4.4	9	5,199	w.	34	nw.	16	12	13	6	4.4	0.0	0.0
Pensacola	56	149	185	29.94	30.00	−.01	83.5	+2.5	99	16	89	72	22	78	22	77	74	78	2.00	−4.8	10	7,998	w.	40	se.	16	10	19	2	4.3	0.0	0.0
Anniston	741	9	57				81.0	+3.1	97	16	92	62	3	70	28				3.37		13		nw.				10	8	13		0.0	0.0
Birmingham	700	11	48	29.25	30.00	−.01	82.4	+2.2	99	16	92	67	3	72	26	74	72	79	4.75	−0.4	12	3,680	n.	27	s.	4	11	12	8	5.1	0.0	0.0
Mobile	57	125	161	29.93	29.99	−.02	84.6	+3.2	99	16	93	72	31	76	24	76	74	75	6.14	−0.8	12	6,071	sw.	30	sw.	3	7	17	7	5.6	0.0	0.0
Montgomery	223	100	112	29.75	29.99	−.03	84.2	+2.5	100	16	94	70	8	75	24	75	72	76	3.49	−1.4	10	4,773	nw.	30	n.	23	8	13	10	5.5	0.0	0.0
Corinth	469	6					83.8		101	15	95	61	3	73	27				9.90		9		sw.				11	19	1		0.0	0.0
Meridian	375	87	95	29.61	29.99	−.03	82.8	+2.4	97	16	92	70	1	73	23	74	72	78	4.18	−0.7	10	3,928	sw.	26	w.	27	12	13	6	4.8	0.0	0.0
Vicksburg	247	65	73	29.74	30.01	+.01	83.8	+2.5	98	13	93	70	10	75	24	75	72	77	2.24	−2.3	12	4,597	se.	25	w.	5	9	13	9	5.2	0.0	0.0
New Orleans	53	76	84	29.94	29.99	−.01	85.2	+2.8	100	16	93	73	21	78	20	77	74	76	6.57	+0.2	12	4,533	sw.	25	ne.	21	5	18	8	5.6	0.0	0.0
West Gulf States							84.4	+1.8										71	2.36	−0.7										3.9		
Shreveport	249	204	220	29.70	29.96	−.02	86.1	+2.9	102	31	96	69	3	76	27	75	71	68	1.04	−2.5	9	6,288	s.	34	sw.	3	14	12	5	4.1	0.0	0.0
Bentonville	1,303	11	44	28.60	29.93	−.04	79.9	+1.4	97	17	90	56	2	70	27				5.47		10	3,888	s.	15	ne.	23	25	4	2		0.0	0.0
Fort Smith	457	79	94	29.46	29.93	−.04	84.1	+2.6	101	16	94	64	2	75	29	75	71	70	1.67	−1.7	4	4,716	e.	30	nw.	23	13	10	8	4.7	0.0	0.0
Little Rock	357	136	153	29.60	29.97	−.02	83.6	+2.7	99	16	92	68	2	75	22	74	71	70	7.76	+4.3	9	5,347	sw.	23	n.	30	12	10	9	4.9	0.0	0.0
Austin	605	136	148	29.32	29.94		85.8	+1.8	103	17	96	72	19	75	26	73	69	64	1.54	−0.8	5	5,977	se.	32	sw.	6	14	12	5	3.8	0.0	0.0
Brownsville	57	83	100	29.86	29.93		83.7	+0.1	99	17	91	71	17	76	28	76	74	79	0.17	−1.8	4	7,484	se.	24	se.	1	17	14	0	3.5	0.0	0.0
Corpus Christi	20	11	78	29.94	29.96	.00	83.9	+1.2	97	17	90	75	16	78	21	77	75	80	0.32	−1.2	4	8,877	se.	41	ne.	18	11	15	5	4.7	0.0	0.0
Dallas	512	220	227	29.42	29.96		84.8		100	29	93	70	6	76	25				1.95	−0.9	6	6,669	se.	32	w.	23	19	7	5	2.8	0.0	0.0
Fort Worth	670	106	114	29.22	29.92	−.04	84.8	+1.2	102	16	94	70	6	76	28	73	68	62	2.07	−0.5	5	6,235	s.	29	e.	19	19	4	8	3.7	0.0	0.0
Galveston	54	106	114	29.89	29.95	−.03	84.4	+1.0	101	16	89	69	17	79	29	77	74	75	1.89	−1.8	8	7,634	s.	35	nw.	17	18	12	1	3.5	0.0	0.0
Houston	138	292	314	29.83	29.97		85.3	+1.6	102	16	94	70	11	76	30				1.88	−2.1	10	7,594	s.	38	se.	17	11	18	2	4.4	0.0	0.0
Palestine'	510	64	72	29.45	29.97	.00	84.8	+2.6	102	17	94	72	6	75	24	73	70	67	1.06	−1.6	6	5,331	s.	32	sw.	6	19	10	2	3.4	0.0	0.0
Port Arthur	34	58	66	29.93	29.97		85.2		101	17	93	72	18	78	24	77	74	75	6.00	−0.9	11	5,751	s.	21	s.	3	13	17	1	4.4	0.0	0.0
San Antonio	693	242	301	29.22	29.92	−.03	85.2	+1.4	105	17	96	70	19	74	26	73	69	68	5.52	+3.4	5	8,219	se.	43	s.	6	14	15	2	3.9	0.0	0.0
Taylor	571	38	51	29.39	29.99	+.03	85.3	+2.6	103	17	96	70	10	74	28				0.18	−2.1	4	6,344	s.	21	s.	5	23	5	3	2.9	0.0	0.0

TABLE 1.—*Climatological data for Weather Bureau stations, July, 1932*—Continued

District and station	Elevation of instruments: Barometer above sea level	Elevation of instruments: Thermometer above ground	Elevation of instruments: Anemometer above ground	Pressure: Station, reduced to mean of 24 hours	Pressure: Sea level, reduced to mean of 24 hours	Pressure: Departure from normal	Temperature of the air: Mean max. + mean min. ÷2	Temperature of the air: Departure from normal	Temperature of the air: Maximum	Temperature of the air: Date	Temperature of the air: Mean maximum	Temperature of the air: Minimum	Temperature of the air: Date	Temperature of the air: Mean minimum	Temperature of the air: Greatest daily range	Mean wet thermometer	Mean temperature of the dew point	Mean relative humidity	Precipitation: Total	Precipitation: Departure from normal	Precipitation: Days with .01, or more	Wind: Total movement	Wind: Prevailing direction	Wind: Maximum velocity: Miles per hour	Wind: Maximum velocity: Direction	Wind: Maximum velocity: Date	Clear days	Partly cloudy days	Cloudy days	Average cloudiness, tenths	Total snowfall	Snow, sleet, and ice on ground at end of month
							°F.	°F.										—	In.	In.										0–10		
Ohio Valley and Tennessee							77.4	+1.0										67	4.13	+0.4										4.4		
	Ft.	Ft.	Ft.	In.	In.	In.			°F		°F	°F		°F	°F	°F.	°F.					Miles									In.	In.
Chattanooga	762	190	215	29.19	29.98	−0.04	80.0	+1.6	97	16	90	57	3	70	27	71	68	71	5.15	+0.9	12	5,555	sw.	31	sw.	3	13	10	8	4.9	0.0	0.0
Knoxville	995	102	111	28.94	29.97	−.05	79.9	+2.8	99	20	90	57	3	69	30	71	67	70	3.58	−0.8	11	4,816	sw.	31	n.	29	15	12	4	4.1	0.0	0.0
Memphis	399	78	86	29.55	29.97	−.03	82.6	+1.9	97	18	90	66	2	75	20	74	72	73	5.20	+2.0	10	4,738	sw.	31	sw.	3	15	10	6	4.2	0.0	0.0
Nashville	546	168	191	29.42	29.98	−.03	81.1	+2.0	96	16	90	58	3	72	25	72	67	67	3.40	−0.5	7	5,778	w.	29	n.	29	14	11	6	4.3	0.0	0.0
Lexington	989	193	230	28.94	29.98	−.03	77.0	+1.1	96	19	86	56	2	68	26				2.58	−1.1	10	8,479	sw.	43	nw.	7	21	7	3	2.9	0.0	0.0
Louisville	525	188	234	29.40	29.97	−.03	79.6	+1.0	97	20	89	60	30	70	25	70	65	64	3.68	0.0	7	6,905	sw.	32	nw.	7	12	15	4	4.5	0.0	0.0
Evansville	431	76	116	29.50	29.96	−.04	81.2	+2.5	99	22	92	59	2	71	26	71	66	65	3.31	−0.1	6	6,076	sw.	30	nw.	5	13	14	4	4.5	0.0	0.0
Indianapolis	822	194	230	29.08	29.94	−.05	77.2	+1.5	97	20	87	56	2	68	26	66	61	60	2.86	−0.5	7	7,197	w.	34	nw.	7	15	12	4	4.2	0.0	0.0
Terre Haute	575	96	129	29.34	29.94		78.3		99	20	89	57	2	68	28	68	62	59	2.05	−1.1	4	6,259	nw.	28	n.	26	17	11	3	3.4	0.0	0.0
Cincinnati	627	11	51	29.29	29.96	−.04	77.1	+2.0	97	21	88	57	30	66	31	68	64	68	6.04	+2.7	9	4,883	sw.	27	sw.	21	16	12	3	4.1	0.0	0.0
Columbus	822	216	230	29.08	29.94	−.06	74.8	−0.1	95	19	85	58	5	65	29	65	60	63	4.31	+0.8	12	7,213	w.	43	nw.	21	14	13	4	4.2	0.0	0.0
Dayton	899	137	173	29.01	29.94		76.0	+0.6	96	19	86	57	31	66	28	66	61	63	3.41	+0.1	9	5,927	sw.	31	nw.	7	16	13	2	3.9	0.0	0.0
Elkins	1,947	59	67	27.98	29.96	−.05	69.5	−0.8	89	20	80	48	25	59	34	64	61	79	7.88	+2.5	14	4,002	w.	25	nw.	1	7	15	9	6.0	0.0	0.0
Parkersburg	637	77	82	29.32	29.97	−.04	74.9	−0.5	97	21	86	55	31	64	33	67	63	71	6.42	+2.1	14	4,323	se.	32	nw.	7	14	8	9	5.1	0.0	0.0
Pittsburgh	842	353	410	29.04	29.92	−.08	73.0	−1.6	93	21	83	55	24	63	29	64	59	65	2.01	−2.0	14	7,085	w.	34	s.	1	9	13	9	5.6	0.0	0.0
Lower Lake Region							74.4	−1.0										67	3.28	0.0										5.2		
Buffalo	767	243	280	29.05	29.86	−.11	67.0	−2.8	84	14	73	50	3	61	21	61	58	74	4.32	+1.3	13	10,469	sw.	43	w.	1	9	11	11	5.9	0.0	0.0
Canton	448	10	61	29.33	29.80		66.1	−4.4	88	21	76	48	20	56	36				3.54	0.0	13	5,939	w.	22	se.	1	10	12	9	5.8	0.0	0.0
Ithaca	836	74	100	28.97	29.85		68.9	−1.6	92	13	79	48	5	58	36	62	58	69	3.85	+0.3	12	6,372	nw.	29	w.	1	6	12	13	6.6	0.0	0.0
Oswego	335	71	85	29.48	29.84	−.12	67.6	−2.8	87	26	75	54	5	61	29	61	57	73	2.14	−0.8	10	6,513	w.	22	sw.	2	10	8	13	5.6	0.0	0.0
Rochester	523	86	102	29.31	29.86	−.11	69.2	−1.5	87	25	78	51	5	61	30	61	57	67	3.67	+0.7	13	6,665	w.	30	w.	1	8	14	9	5.7	0.0	0.0
Syracuse	596	65	79	29.22	29.86	−.11	69.4	−1.4	91	13	78	52	5	61	32				4.85	+1.2	11	5,643	nw.	22	nw.	11	11	12	8	5.4	0.0	0.0
Erie	714	130	166	29.14	29.89	−.09	70.0	−1.0	86	13	77	53	5	63	24	64	61	72	2.25	−0.8	13	8,681	w.	35	s.	10	12	11	8	4.7	0.0	0.0
Cleveland	762	267	337	29.10	29.91	−.08	72.0	+0.6	93	13	79	55	2	65	27	63	58	63	2.42	−1.0	10	9,246	w.	40	w.	2	8	16	7	5.5	0.0	0.0
Sandusky	629	5	67	29.25	29.92	−.07	73.8	+0.4	100	21	84	54	5	64	33				3.78	+0.3	11	5,903	sw.	27	nw.	21	8	17	6	4.9	0.0	0.0
Toledo	628	79	87	29.25	29.92	−.07	73.8	+0.6	98	19	84	55	5	64	29	64	58	59	3.23	+0.2	10	6,841	w.	29	w.	10	20	9	2	3.2	0.0	0.0
Fort Wayne	856	100	119	29.03	29.93		74.4	+0.9	98	15	85	56	2	64	29	65	60	62	2.15	−1.4	6	6,515	w.	28	w.	1	13	14	4	4.0	0.0	0.0
Detroit	730	218	258	29.14	29.91	−.07	73.0	+0.9	99	19	82	55	3	64	27	64	58	64	3.11	−0.2	11	7,183	sw.	30	sw.	1	11	15	5	4.5	0.0	0.0
Upper Lake Region							68.8	+0.9										69	3.82	+0.7										4.6		
Alpena	609	13	89	29.23	29.89	−.08	66.8	+0.9	93	25	77	45	3	56	31	60	55	70	1.87	−0.9	9	7,986	nw.	27	nw.	8	10	15	6	4.6	0.0	0.0
Escanaba	612	54	60	29.24	29.90	−.07	66.8	+0.8	93	18	77	47	3	57	38	60	56	69	5.87	+2.5	12	7,273	s.	32	nw.	1	7	16	8	5.2	0.0	0.0
Grand Haven	632	54	89	29.24	29.90	−.08	59.4	+0.7	90	14	77	52	3	61	27	64	60	71	3.37	+0.8	8	7,584	sw.	32	w.	1	13	12	6	4.3	0.0	0.0
Grand Rapids	707	70	244	29.15	29.90	−.08	73.0	+0.7	95	19	83	55	2	63	29	63	57	61	4.15	+1.2	6	8,139	sw.	31	w.	1	11	16	4	4.6	0.0	0.0
Houghton	668	64	99	29.16	29.88	−.08	65.0	−0.5	89	12	74	42	4	56	35				8.52	+5.4	13	7,284	w.	32	w.	10	10	12	9	5.5	0.0	0.0
Lansing	878	6	88	28.98	29.90		70.2	−0.7	95	21	82	48	24	59	35	64	60	73	3.44	+0.3	8	6,421	w.	25	w.	10	10	16	5	4.4	0.0	0.0
Ludington	637	60	66	29.22	29.91		67.9	+1.7	87	14	75	53	5	61	24	63	59	73	1.65	−1.4	8	7,265	s.	23	n.	1	20	8	3	2.9	0.0	0.0
Marquette	734	77	111	29.10	29.87	−.07	65.8	+0.9	96	12	75	45	4	57	40	59	55	68	4.26	+1.1	13	6,842	w.	34	nw.	12	7	16	8	5.8	0.0	0.0
Port Huron	638	79	120	29.21	29.90	−.08	69.2	+0.4	93	13	78	48	3	60	27	62	58	71	5.39	+2.6	11	7,394	nw.	37	n.	13	11	13	7	5.0	0.0	0.0
Sault Sainte Marie	614	11	52	29.20	29.88	−.09	61.8	−2.0	86	25	71	45	3	53	34	57	54	75	3.16	+0.3	13	5,854	nw.	26	nw.	22	11	14	6	4.5	0.0	0.0
Chicago	673	7	131	29.22	29.94	−.04	74.7	+2.2	97	15	83	55	2	66	28	66	62	68	4.67	+1.3	11	7,324	sw.	31	se.	5	12	16	3	4.0	0.0	0.0
Green Bay	617	109	141	29.24	29.89	−.08	71.5	+1.5	97	20	82	49	4	61	34	62	57	64	2.21	−1.2	11	7,748	sw.	32	nw.	28	9	11	11	5.4	0.0	0.0
Milwaukee	681	97	221	29.19	29.92	−.05	74.3	+4.2	98	19	83	55	2	66	27	64	59	62	3.12	+0.3	9	9,181	w.	34	s.	10	14	13	4	3.8	0.0	0.0
Duluth	1,133	5	47	28.70	29.90	−.05	66.2	+2.3	97	18	77	47	4	56	36	59	56	73	1.84	−1.9	10	7,295	ne.	38	w.	12	8	15	8	4.9	0.0	0.0
North Dakota							71.0	+2.4										62	2.06	−0.6										3.6		
Moorhead	940	50	58	28.88	29.87	−.07	72.1	+4.0	104	19	85	46	2	60	35	62	56	60	1.36	−2.1	9	5,816	s.	22	s.	11	14	13	4	4.3	0.0	0.0
Bismarck	1,674	8	57	28.12	29.86	−.07	72.0	+2.2	99	19	85	46	1	59	40	61	55	60	1.38	−0.9	7	6,654	se.	27	nw.	6	17	12	2	3.2	0.0	0.0
Devils Lake	1,478	11	44	28.34	29.88	−.05	68.5	+1.1	100	17	81	45	1	56	39	61	56	69	3.87	+1.3	11	6,101	se.	26	n.	24	14	10	7	4.4	0.0	0.0
Ellendale	1,457	10	56	28.36	29.89		70.6		101	19	84	46	2	57	41				1.93	−1.2	9	8,440	nw.	32	s.	11	13	13	5	4.4	0.0	0.0
Grand Forks	833	12	67				70.7		101	17	84	44	2	58	39	62			1.51		10		nw.	40	nw.	25	13	13	5		0.0	0.0
Williston	1,878	41	48	27.91	29.84	−.08	71.4	+2.5	103	18	85	47	1	58	39	60	52	57	1.75	−0.1	9	5,565	se.	34	w.	19	25	4	2	1.8	0.0	0.0
Upper Mississippi Valley							76.9	+1.9										65	3.26	−0.3										3.9		
Minneapolis	918	102	208	28.91	29.88		74.7	+2.4	101	20	85	50	4	65	28				4.36	+0.6	8	7,726	s.	37	e.	9	14	13	4	4.0	0.0	0.0
St. Paul	837	114	149	29.01	29.89	−.06	74.6	+2.5	100	14	85	51	4	64	29				3.86	+0.3	6	6,614	sw.	27	nw.	1	17	12	2	3.5	0.0	0.0
La Crosse	714	11	48	29.15	29.90	−.06	73.6	+0.8	99	20	86	49	2	62	35	65	60	68	2.58	−1.3	5	3,543	s.	15	sw.	25	17	11	3	3.7	0.0	0.0
Madison	974	70	78	28.90	29.91	−.06	73.7	+1.6	95	20	83	53	2	64	27	64	59	63	4.06	+0.2	8	5,778	sw.	25	sw.	25	14	14	3	3.8	0.0	0.0
Wausau	1,247	4	62	28.60	29.91		70.5		100	20	83	44	4	58	37				1.55	−2.7	8	5,025	n.	21	sw.	25	19	9	3	3.6	0.0	0.0
Charles City	1,015	10	51	28.87	29.92	−.04	73.7	+1.4	97	20	86	49	2	62	31	66	61	66	2.70	−1.1	8	4,728	se.	20	nw.	9	18	9	4	2.9	0.0	0.0
Davenport	606	118	143	29.29	29.94	−.03	77.4	+2.1	98	15	87	52	2	68	27	67	62	62	3.33	0.0	9	6,142	sw.	31	se.	5	10	16	5	4.4	0.0	0.0
Des Moines	861	5	99	29.03	29.92	−.04	77.4	+2.0	98	19	88	52	2	67	30	67	62	62	2.76	−0.7	10	6,510	s.	30	n.	10	13	10	8	4.4	0.0	0.0
Dubuque	700	81	96	29.19	29.92	−.05	76.0	+1.9	97	15	86	53	2	66	27	66	61	64	2.15	−1.8	5	4,898	s.	20	nw.	6	13	12	6	4.2	0.0	0.0
Keokuk	614	64	78	29.30	29.96	−.02	78.3	+1.4	97	20	88	55	2	69	30	69	64	64	4.53	+1.1	10	4,959	sw.	26	sw.	3	17	5	9	4.2	0.0	0.0
Cairo	358	87	93	29.58	29.94	−.06	81.5	+1.9	98	15	91	62	2	72	23	73	69	71	2.58	−0.5	8	5,323	sw.	27	n.	10	10	11	10	5.4	0.0	0.0
Peoria	609	11	45	29.31	29.96	−.02	76.7	+1.3	98	20	88	51	2	65	33	68	64	67	3.41	−0.2	6	4,195	sw.	25	sw.	3	18	7	6	3.3	0.0	0.0
Springfield, Ill	636	5	191	29.28	29.94	−.04	79.0	+2.5	100	15	90	56	2	68	30	68	63	62	2.30	−0.6	8	5,818	s.	34	nw.	9	14	15	2	3.9	0.0	0.0
Hannibal	534	74	109	29.39	29.95	−.03	79.0	+2.2	100	15	89	57	2	69	34				3.48	+0.4	10	5,834	sw.	28	sw.	3	14	9	8	4.1	0.0	0.0
St. Louis	568	265	303	29.35	29.95	−.04	81.6	+3.0	101	15	91	62	2	73	26	70	65	61	5.30	+2.3	9	7,486	w.	42	sw.	22	18	10	3	3.5	0.0	0.0
Missouri Valley							78.9	+3.0										61	2.92	−0.7										3.9		
Columbia, Mo	784	6	84	29.13	29.94	−.04	79.1	+2.2	100	22	89	55	2	69	31				3.39	−0.1	8	5,093	sw.	32	nw.	4	15	10	6	4.0	0.0	0.0
Kansas City	963	10	86	28.93	29.92	−.05	81.4	+3.3	98	15	90	63	2	72	25	71	66	63	2.57	−1.6	8	6,218	s.	31	nw.	4	17	10	4	3.5	0.0	0.0
St. Joseph	967	11	49	28.91	29.91		79.6		98	16	90	55	2	70	29	70	66	67	4.06	+0.4	10	5,576	se.	31	nw.	4	20	4	7	3.3	0.0	0.0
Springfield, Mo	1,324	98	104	28.59	29.96	−.02	79.0	+2.2	95	16	87	60	2	71	22	71	68	71	3.88	−0.3	10	5,982	s.	26	w.	1	14	15	2	3.4	0.0	0.0
Iola	984	11	50	28.87	29.87	−.10	81.6	+3.4	101	16	93	55	2	70	31				5.56	+1.8	8		s.					20	5	6		0.0	0.0
Topeka	987	92	107				80.8	+3.0	100	15	91	60	2	71	28				2.89	−1.4	9	6,314	s.	30	n.	6	20	7	4	3.3	0.0	0.0
Lincoln	1,189	11	81	28.67	29.89	−.06	79.8	+3.3	101	14	90	54	2	69	33	70	65	66	5.68	+1.8	10	7,061	s.	32	nw.	23	16	9	6	4.2	0.0	0.0
Omaha	1,105	115	122	28.76	29.91	−.04	79.2	+2.5	101	14	89	59	2	70	25	68	62	60	2.84	−0.7	7	5,590	s.	25	nw.	1	16	9	6	3.9	0.0	0.0
Valentine	2,598	47	54	27.26	29.91	−.02	75.2	+1.5	102	19	88	51	1	63	40	63	57	60	2.05	−1.0	11	6,972	s.	29	sw.	11	8	19	4	4.2	0.0	0.0
Sioux City	1,135	94	164	28.71	29.88	−.07	77.8	+3.5	101	14	88	51	2	67	32	66	60	60	2.61	−0.9	9	7,632	s.	44	nw.	27	15	8	8	4.2	0.0	0.0
Huron	1,306	59	74	28.53	29.89	−.05	76.3	+4.5	103	19	89	49	2	63	38	63	55	51	0.15	−3.0	5	7,332	se.	26	w	5	24	3	4	3.1	0.0	0.0
Pierre	1,572	70	75	28.23	29.86	−.07	78.0	+2.7	106	19	90	55	1	66	34	64	56	51	1.08	−1.6	4	7,013	se.	28	sw.	24	18	11	2	3.6	0.0	0.0
Yankton	1,233	49	57	28.62	29.90	−.04	78.4	+4.2	104	27	89	53	2	68	32				1.16	−2.2	8	5,961	se.	21	sw.	12	13	12	6	6.3	0.0	0.0

TABLE 1.—*Climatological data for Weather Bureau stations, July 1, 1932*—Continued

District and station	Elevation of instruments: Barometer above sea level	Elevation of instruments: Thermometer above ground	Elevation of instruments: Anemometer above ground	Pressure: Station, reduced to mean of 24 hours	Pressure: Sea level, reduced to mean of 24 hours	Pressure: Departure from normal	Temperature of the air: Mean max. + mean min. ÷2	Temperature of the air: Departure from normal	Temperature of the air: Maximum	Temperature of the air: Date	Temperature of the air: Mean maximum	Temperature of the air: Minimum	Temperature of the air: Date	Temperature of the air: Mean minimum	Temperature of the air: Greatest daily range	Mean wet thermometer	Mean temperature of the dew point	Mean relative humidity	Precipitation: Total	Precipitation: Departure from normal	Precipitation: Days with .01, or more	Wind: Total movement	Wind: Prevailing direction	Wind: Maximum velocity: Miles per hour	Wind: Maximum velocity: Direction	Wind: Maximum velocity: Date	Clear days	Partly cloudy days	Cloudy days	Average cloudiness, tenths	Total snowfall	Snow, sleet, and ice on ground at end of month
	Ft.	Ft.	Ft.	In.	In.	In.	°F.	°F.	°F		°F	°F.		°F	°F.	°F.	°F.	—	In.	In.		Miles								0–10	In.	In.
Northern Slope							70.5	+2.7										52	1.66	0.0									4.0			
Billings	3,140	5					71.7		100	17	91	41	5	53	50				0.42		7		nw.				13	15	3		0.0	0.0
Havre	2,505	11	67	27.27	29.85	−0.06	70.2	+1.9	99	23	85	46	7	56	42	56	46	50	1.07	−0.8	7	6,478	sw.	34	sw.	17	18	9	4	3.5	0.0	0.0
Helena	4,124	89	113	25.77	29.86	−.07	68.8	+3.1	95	16	83	43	5	55	41	55	46	52	1.22	+0.1	9	6,965	sw.	37	s.	13	11	15	5	4.7	0.0	0.0
Kalispell	2,973	48	56	26.89	29.88	−.05	65.8	+1.7	95	28	80	42	6	52	42	52	42	49	0.68	−0.4	6	5,335	nw.	22	w.	3	13	14	4	3.8	0.0	0.0
Miles City	2,371	48	55	27.39	29.87	−.05	75.6	+2.7	103	17	89	49	7	62	38	60	50	47	1.37	−0.2	7	4,770	s.	31	sw.	19	17	13	1	3.0	0.0	0.0
Rapid City	3,259	50	58	26.59	29.91	−.02	73.4	+2.4	100	18	86	48	5	60	38	61	53	53	2.73	+0.3	11	5,432	w.	31	nw.	24	14	10	7	3.9	0.0	0.0
Cheyenne	6,088	84	101	24.09	29.89	−.03	70.0	+3.3	90	21	84	44	5	56	36	55	45	49	0.97	−1.1	13	7,820	w.	35	w.	4	9	14	8	5.0	0.0	0.0
Lander	5,372	60	68	24.67	29.86	−.06	70.6	+3.2	94	26	87	40	5	54	42	53	40	40	0.14	−0.6	2	4,577	sw.	35	sw.	13	15	12	4	3.8	0.0	0.0
Sheridan	3,790	10	47	26.07	29.88		70.1		99	17	86	42	5	54	47	58	50	56	0.60	−0.6	7	3,521	nw.	21	se.	10	16	10	5	3.6	0.0	0.0
Yellowstone Park	6,241	11	48	23.96	29.94	+.02	61.8	+0.3	84	29	76	34	5	47	38	49	40	53	1.09	−0.2	10	5,931	sw.	34	sw.	13	10	19	2	4.2	0.0	0.0
North Platte	2,821	11	51	27.03	29.87	−.06	78.3	+5.4	101	19	91	54	1	66	33	67	62	66	6.69	+4.0	11	5,250	se.	30	ne.	22	13	15	3	4.0	0.0	0.0
Middle Slope							80.7	+3.6										56	2.23	−0.6									3.4		
Denver	5,292	106	113	24.78	29.89	−.02	75.6	+3.4	94	8	88	57	5	63	34	58	46	44	0.85	−0.8	9	6,048	s.	30	se.	10	8	19	4	4.5	0.0	0.0
Pueblo	4,685	80	86	25.31	29.86	−.05	78.6	+4.4	100	19	93	60	2	64	37	59	49	45	1.77	−0.2	7	5,451	e.	31	nw.	24	11	19	1	4.3	0.0	0.0
Concordia	1,392	50	58	28.48	29.90	−.05	81.0	+3.0	101	15	92	60	2	70	31	70	65	63	3.43	−0.4	8	6,110	s.	25	ne.	28	19	9	3	3.4	0.0	0.0
Dodge City	2,509	10	86	27.37	29.89	−.04	82.7	+4.3	104	4	96	64	5	70	34	67	60	54	2.38	−0.8	4	8,925	s.	32	se.	26	23	7	1	2.0	0.0	0.0
Wichita	1,358	85	93	28.51	29.89	−.07	82.8	+3.4	101	16	93	59	1	72	30	71	65	62	2.53	−0.8	7	7,954	s.	33	n.	5	18	5	8	3.8	0.0	0.0
Oklahoma City	1,214	10	47	28.68	29.92	−.04	83.5	+2.9	102	30	94	66	2	73	27	72	68	67	2.40	−0.5	3	6,752	s.	26	ne.	5	22	4	5	2.6	0.0	0.0
Southern Slope							82.0	+0.8										57	2.17	−0.2									3.2		
Abilene	1,738	10	52	28.16	29.91	−.02	83.0	+0.2	100	29	94	66	6	72	28	70	65	60	4.49	+2.4	5	6,637	s.	20	n.	6	21	6	4	2.6	0.0	0.0
Amarillo	3,676	10	49	26.28	29.90	−.02	80.2	+3.4	100	31	92	63	2	68	30	66	59	55	1.22	−1.6	4	7,170	s.	22	ne.	5	23	7	1	2.6	0.0	0.0
Big Spring	2,537	5	62				81.4		101	31	92	67	12	71	28	69	63	60	0.90		3		se.				19	9	3	3.0	0.0	0.0
Del Rio	944	64	71	28.90	29.85	−.05	85.0	−1.3	103	18	94	69	2	76	28	72	67	61	0.92	−1.5	5	8,342	se.	27	s.	6	12	12	7	4.4	0.0	0.0
Roswell	3,566	75	85	26.35	29.86	−.02	80.0	+1.1	99	4	93	63	3	67	34	64	55	51	2.06	−0.2	7	5,459	s.	30	sw.	11	18	11	2	3.4	0.0	0.0
Southern Plateau							80.1	+1.1										50	1.16	0.0									3.7		
El Paso	3,778	152	175	26.15	29.82	−.02	83.0	+1.9	105	5	95	67	11	71	30	65	56	47	2.28	+0.3	9	6,713	e.	34	ne.	11	14	12	5	3.9	0.0	0.0
Albuquerque	4,972	51	66	25.10	29.83		76.7		98	4	90	58	3	63	38	61	53	54	2.01		17	4,111	sw.	26	w.	11	13	12	6	4.5	0.0	0.0
Santa Fe	7,013	38	53	23.37	29.87	−.01	69.6	+0.6	90	18	82	50	3	57	34	55	47	53	2.07	−0.3	12	4,475	e.	25	n.	6	8	17	6	5.2	0.0	0.0
Flagstaff	6,907	10	59	23.44	29.84	+.01	66.1	+1.1	89	21	81	42	14	51	40	53		62	2.37		16	6,026	nw.	27	nw.	8	4	15	12		0.0	0.0
Phoenix	1,108	10	107	28.64	29.75	−.03	91.8	+2.0	112	22	104	75	2	80	33	69	57	38	0.11	−1.0	2	5,112	e.	32	n.	1	18	9	4	3.4	0.0	0.0
Yuma	141	9	54	29.61	29.75	−.01	90.8	0.0	112	22	105	67	14	77	39	72	62	45	1.36	+1.2	1	4,644	s.	25	s.	29	24	7	0	1.7	0.0	0.0
Independence	3,957	6	27	25.91	29.84	+.01	79.2	+1.1	104	3	96	52	14	62	40	54			0.00	−0.1	0		nw.				27	4	0		0.0	0.0
Middle Plateau							73.2	+0.7										34	0.76	+0.2									2.7		
Reno	4,532	74	81	25.45	29.86	−.01	70.2	+2.7	98	26	87	44	14	53	43	51	35	34	0.04	−0.2	1	6,384	w.	30	w.	12	29	2	0	1.0	0.0	0.0
Tonopah	6,090	12	20				73.2		93	3	85	46	13	61	33	50	28	21	0.02		1		se.									
Winnemucca	4,344	18	56	25.58	29.88	−.02	70.7	+0.1	98	26	89	44	20	52	46	50	33	32	0.27	+0.1	3	5,504	sw.	32	w.	18	27	3	1	1.2	0.0	0.0
Modena	5,473	10	46	24.63	29.83	−.03	70.6	0.0	96	7	87	39	14	54	46	53	39	41	1.12	0.0	6	7,537	sw.	35	sw.	13	19	7	5	3.4	0.0	0.0
Salt Lake City	4,360	163	203	25.60	29.86	−.04	76.7	+1.0	95	26	88	54	5	65	32	57	42	34	0.52	0.0	7	6,252	s.	37	sw.	13	17	8	6	3.3	0.0	0.0
Grand Junction	4,602	60	68	25.38	29.88	−.01	77.6	−0.1	102	7	91	53	5	64	39	58	46	40	1.85	+1.2	12	5,214	se.	30	s.	10	10	15	6	4.5	0.0	0.0
Northern Plateau							70.6	−0.5										41	0.41	−0.1									2.9		
Baker	3,471	48	53	26.43	29.96	+.01	64.9	−0.7	95	22	81	39	5	49	46	51	29	45	0.13	−0.4	2	4,849	n.	21	sw.	10	20	5	6	3.0	0.0	0.0
Boise	2,739	79	87	27.08	29.87	−.06	73.0	+0.1	98	28	88	48	20	58	39	55	42	41	0.91	+0.7	3	4,239	nw.	21	se.	9	24	4	3	2.3	0.0	0.0
Lewiston	757	40	48	29.12	29.91	−.04	74.2	+0.2	103	21	89	52	5	60	45				0.08	−0.4	2	4,080	e.	23	nw.	10	21	6	4	2.8	0.0	0.0
Pocatello	4,477	60	68	25.47	29.87	−.05	71.8	+1.0	96	7	86	41	5	57	45	54	42	41	1.07	+0.3	7	7,000	se.	38	se.	13	21	8	2	3.1	0.0	0.0
Spokane	1,929	101	110	27.91	29.91	−.05	69.1	+0.1	96	22	82	47	4	56	40	53	39	40	0.21	−0.5	4	5,153	s.	20	s.	10	17	9	5	3.3	0.0	0.0
Walla Walla	991	57	65	28.87	29.93	−.04	71.8	−2.2	100	21	84	52	11	59	39	55	41	38	0.33	−0.1	3	4,762	w.	28	w.	3	20	7	4	2.8	0.0	0.0
Yakima	1,076	58	67	28.80	29.94		69.7	−1.7	96	22	84	46	11	56	40	54	41	41	0.16	−0.2	4	5,384	nw.	24	w.	3	21	5	5	2.7	0.0	0.0
North Pacific Coast Region							60.7	−1.3										70	1.83	+1.2									5.6		
North Head	211	11	56	29.86	30.08	.00	56.3	−0.9	65	25	60	47	9	53	10	54	52	88	1.40	+0.4	16	10,906	n.	46	s.	15	4	10	17	7.4	0.0	0.0
Port Angeles	29	8	53		30.08		56.4		74	9	63	42	8	49	29				1.08	+0.6	12	5,515	w.	24	w.	3	5	12	14		0.0	0.0
Seattle	125	215	250	29.90	30.02	−.02	61.1	−2.0	78	21	68	49	6	54	24	54	49	69	1.88	+1.2	9	6,497	s.	31	sw.	3	6	10	15	6.2	0.0	0.0
Tacoma	194	172	201	29.85	30.05	−.01	61.4	−1.4	81	21	70	47	6	53	28				1.97	+1.4	11	6,106	n.	40	sw.	3	6	11	14	6.0	0.0	0.0
Tatoosh Island	86	9	53	29.95	30.04	−.01	54.3	−0.8	64	26	58	45	9	51	14	52	51	89	7.73	+6.2	18	6,753	s.	32	s.	15	1	6	24	8.4	0.0	0.0
Medford	1,329	29	58	28.57	29.95		68.2		96	6	85	42	11	51	50	55	45	52	0.04	−0.3	1	5,228	nw.	27	nw.	9	21	7	3	2.4	0.0	0.0
Portland, Oreg	153	68	106	29.88	30.03	−.02	65.8	−0.9	86	21	76	49	6	56	30	57	51	64	0.48	−0.1	8	5,232	nw.	19	sw.	10	10	9	12	5.3	0.0	0.0
Roseburg	510	75	99	29.48	30.02	−.01	65.4	−2.0	88	21	79	45	12	52	38	55	47	58	0.08	−0.2	3	4,379	n.	19	n.	4	18	7	6	3.2	0.0	0.0
Middle Pacific Coast Region							67.3	+0.4										64	0.03	0.0									2.5		
Eureka	62	73	89	29.99	30.06	+.01	56.2	+0.7	68	15	60	46	6	52	15	53	51	86	0.14	0.0	4	5,803	n.	24	n.	3	8	12	11	5.5	0.0	0.0
Red Bluff	330	5	58	29.49	29.83	−.06	81.0	+0.2	106	1	96	55	10	66	38	61	46	36	0.00	0.0	0	4,689	s.	30	se.	9	25	6	0	1.3	0.0	0.0
Sacramento	69	106	117	29.78	29.86	−.02	73.4	+0.2	106	8	90	50	10	57	44	60	52	54	T.	0.0	0	6,803	s.	27	sw.	9	31	0	0	0.2	0.0	0.0
San Francisco	155	208	243	29.77	29.94	−.01	59.7	+1.2	74	4	66	50	23	53	20	54	52	80	T.	0.0	0	6,312	sw.	25	w.	18	12	16	3	4.1	0.0	0.0
San Jose	141	12	110	29.80	29.95		66.4	−0.5	94	8	80	47	29	53	39				0.00	0.0	0	5,078	nw.	30	sw.	9	28	2	1	1.4	0.0	0.0
South Pacific Coast Region							71.7	−1.5										64	T.	0.0									2.7		
Fresno	327	89	98	29.49	29.83	.00	80.4	−1.7	108	7	97	54	19	64	40	60	44	36	0.00	0.0	0	6,595	nw.	24	nw.	9	30	1	0	0.3	0.0	0.0
Los Angeles	338	159	191	29.55	29.90	.00	69.1	−1.1	84	29	78	58	13	60	24	61	58	74	T.	0.0	0	4,039	sw.	13	w.	13	18	13	0	3.1	0.0	0.0
San Diego	87	62	70	29.81	29.90	−.02	65.6	−1.6	74	29	70	58	24	61	13	61	59	81	T.	0.0	0	5,031	sw.	16	nw.	16	10	17	4	4.7	0.0	0.0
West Indies																																
San Juan, P. R.	82	9	54	29.91	30.00		80.8	+0.7	91	13	86	73	29	76	15				5.07	−.09	20	7,562	e.	27	e.	23	3	22	6	5.8	0.0	0.0
Panama Canal																																
Balboa Heights	118	6	97		[2]29.81	−.01	80.6	+0.3	92	15	87	69	30	74	17			[1]86	6.29	−1.0	19	4,349	nw.	22	n.	16	0	9	22	7.8	0.0	0.0
Cristobal	36	6	97		[2]29.82	−.02	81.3	+0.9	89	15	86	73	30	76	13	77	76	[1]84	17.45	+1.8	28	5,441	n.	31	nw.	26	0	4	27	8.7	0.0	0.0
Alaska																																
Fairbanks	455	11	44	[2]29.29	[2]29.79		58.9		81	27	70	39	18	48	34	52	47	71	2.33		13	3,412	w.	18	s.	16	4	12	15	6.6	0.0	0.0
Juneau	80	11	50	[2]29.84	[2]29.93		53.4		76	10	58	44	2	48	30	50	46	80	5.77		24	4,559	s.	22	s.	11	2	2	27	9.0	0.0	0.0
Hawaiian Islands																																
Honolulu	38	86	100	[2]29.99	[2]30.03		76.4	−1.3	83	8	81	68	5	72	12	69	66	72	0.59	−0.6	16	7,669	e.	25	e.	11	15	15	1	3.7	0.0	0.0

[1] Observations taken bihourly.

[2] Pressure not reduced to mean of 24 hours.

TABLE 2.—*Data furnished by the Canadian Meteorological Service, July, 1932*

Stations	Altitude above mean sea level, Jan. 1, 1919	Pressure			Temperature of the air						Precipitation		
		Station reduced to mean of 24 hours	Sea level reduced to mean of 24 hours	Departure from normal	Mean max.+ mean min.÷2	Departure from normal	Mean maximum	Mean minimum	Highest	Lowest	Total	Departure from normal	Total snowfall
	Feet	*Inches*	*Inches*	*Inches*	*° F.*	*° F.*	*° F.*	*° F.*	*° F.*	*° F.*	*Inches*	*Inches*	*Inches*
Cape Race, N. F.	99				52.7		58.8	46.7	73	39	6.57		0.0
Sydney, C. B. I.	48												
Halifax, N. S.	88												
Yarmouth, N. S.	65												
Charlottetown, P. E. I.	38												
Chatham, N. B.	28												
Father Point, Que.	20	29.66	29.68	−0.17	56.6	−1.0	64.7	48.4	76	42	4.44	+1.40	0.0
Quebec, Que.	296	29.42	29.73	−.18	64.8	−0.7	73.7	55.8	83	46	4.58	+0.32	0.0
Doucet, Que.	1,236				55.7		68.4	43.1	85	31	6.15		0.0
Montreal, Que.	187	29.54	29.74	−.19	68.4	−0.1	76.7	60.0	85	53	3.34	−0.95	0.0
Ottawa, Ont.	236	29.52	29.77	−.17	67.3	−2.2	78.1	56.6	88	46	2.86	−0.61	0.0
Kingston, Ont.	285	29.52	29.82	−.15	66.0	−2.2	73.5	58.5	83	50	2.59	−0.30	0.0
Toronto, Ont.	379	29.45	29.84	−.13	67.6	−0.4	76.1	59.1	87	50	3.56	+0.64	0.0
Cochrane, Ont.	930				59.7		70.8	48.7	83	38	5.06		0.0
White River, Ont.	1,244	28.54	29.82	−.12	59.5	0.0	71.9	47.0	84	30	4.05	+1.25	0.0
London, Ont.	808				66.2		76.1	56.4	90	41	10.22		0.0
Southampton, Ont.	656	29.16	29.87	−.10	64.4	−0.3	72.7	56.1	84	45	4.06	+2.08	0.0
Parry Sound, Ont.	688	29.16	29.84	−.12	64.8	−1.2	73.4	56.2	84	43	2.46	−0.16	0.0
Port Arthur, Ont.	644	29.18	29.89	−.05	63.5	+1.5	73.4	53.6	88	43	4.78	+1.30	0.0
Winnipeg, Man.	760	29.11	29.92	−.01	67.1	+1.1	78.0	56.2	90	41	2.46	−0.62	0.0
Minnedosa, Man.	1,690	28.11	29.89	−.04	64.5	+2.3	76.5	52.5	93	40	2.10	−0.50	0.0
Le Pas, Man.	860				65.3		76.2	54.5	85	42	2.58		0.0
Qu'Appelle, Sask.	2,115	27.63	29.83	−.09	65.1	+1.6	78.0	52.3	98	40	1.58	−0.90	0.0
Moose Jaw, Sask.	1,759				67.8		82.4	53.2	100	43	2.83		0.0
Swift Current, Sask.	2,392	27.36	29.83	−.08	65.1	−1.4	78.5	51.7	94	38	6.00	+3.56	0.0
Medicine Hat, Alb.	2,365												
Calgary, Alb.	3,540												
Banff, Alb.	4,521												
Prince Albert, Sask.	1,450	28.32	29.87	−.04	64.3	+2.4	74.8	53.7	87	45	4.81	+2.76	0.0
Battleford, Sask.	1,592	28.11	29.82	−.08	63.9	−0.8	76.1	51.7	94	41	2.27	−0.07	0.0
Edmonton, Alb.	2,150												
Kamloops, B. C.	1,262												
Victoria, B. C.	230	29.78	30.03	−.02	57.1	−2.9	63.5	50.8	74	48	1.93	+1.53	0.0
Barkerville, B. C.	4,180												
Estevan Point, B. C.	20												
Prince Rupert, B. C.	170												
Hamilton, Ber.	151	29.90	30.06	−.08	79.8	+1.1	84.6	75.0	89	71	5.89	+1.45	0.0

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Cape Race, N. F.	99				45.1		52.7	37.5	75	29	2.02		0.0
Sydney, C. B. I.	48	29.79	29.84	−0.11	56.5	+1.1	68.1	44.8	86	35	1.96	−1.27	0.0
Halifax, N. S.	88	29.73	29.83	−.12	58.3	+0.6	69.1	47.4	82	40	2.66	−1.10	0.0
Yarmouth, N. S.	65	29.75	29.82	−.13	55.4	+0.4	63.5	47.3	76	40	3.81	+0.88	0.0
Charlottetown, P. E. I.	38	29.73	29.77	−.15	58.3	+0.9	66.6	50.0	80	40	1.08	−1.59	0.0
Chatham, N. B.	28	29.66	29.69	−.20	59.3	−0.7	70.7	48.0	86	34	3.56	+0.10	0.0
Medicine Hat, Alb.	2,365	27.37	29.81	−.04	63.5	+1.5	74.4	52.6	93	44	1.19	−1.57	0.0
Calgary, Alb.	3,540	26.25	29.86	+.02	57.5	+1.5	68.4	46.6	80	35	4.72	+2.27	0.0
Banff, Alb.	4,521	25.35	29.85	+.01	53.7	+2.2	67.1	40.4	82	31	3.56	+0.23	0.0
Edmonton, Alb.	2,150	27.59	29.83	−.01	60.0	+3.1	72.4	47.7	83	35	2.09	−0.77	0.0
Kamloops, B. C.	1,262	28.62	29.88	+.01	66.8	+3.0	78.8	54.8	92	41	0.31	−1.11	0.0
Estevan Point, B. C.	20				51.6		56.7	46.6	69	40	2.41		0.0
Prince Rupert, B. C.	170				52.9		58.8	47.0	70	41	4.77		0.0

SEVERE LOCAL STORMS, JULY, 1932

[The table herewith contains such data as have been received concerning severe local storms that occurred during the month. A revised list of tornadoes will appear in the Annual Report of the Chief of Bureau]

Place	Date	Time	Width of path (yards)	Loss of life	Value of property destroyed	Character of storm	Remarks	Authority
Charleston Center, Ohio	1	1:45 p. m.	880			Possibly tornado	Crops hurt severely; minor damage to buildings	Official, U. S. Weather Bureau.
Ithaca and McGraw, N. Y.	1	2-3 p. m.				Severe thunderstorm.	Scores of trees blown down; much damage to overhead wires.	Do.
Rochester, N. Y., and vicinity.	1	12:27 p. m.	440	2	$100,000	Tornado, rain and electrical.	Many houses and small buildings damaged; garages and trees wrecked; wires and poles blown down.	Do.
Freeland (near), Pa	2	6 p. m.	10		10,000	Small tornado	Much minor damage to small buildings and trees.	Do.
Wanblee to Mission, S. Dak.	2	4:45-7:30 p. m.	[1] 1-5			Hail and wind	Heavy crop injury; small buildings wrecked	Do.
Asotin County, Wash.	3					High wind	Fruit blown off; trees damaged	Do.
Hubbell (near) Nebr., to Washington (near), Kans.	4	4:15-5:15 p. m.	880	7	50,000	Tornado	Many homes and public buildings wrecked or damaged; path 30 miles long.	Do.
Boyd to Susank, Kans.	4	5 p. m.				do	Wheat damaged	Do.
Russell and Barton Counties, Kans.	4	5-7 p. m.	[1] 15		100,000	Heavy hail	Chief damage to wheat; some windows broken; path 18 miles long.	Do.
Missouri (northern half)	4	P. m.				Squall winds and thunderstorms.	About one-third of telephone and power lines broken by falling limbs; barns unroofed or wrecked; windows shattered.	Do.
Lepanto (near), Ark.	5				3,500	Electrical	Large barn and contents destroyed by fire	Do.
Knox, Pierce, Cedar, and Wayne Counties, Nebr.	6	2:30-4 p.m.	[1] 7			Hail	Considerable damage to crops over part of area; roofs and windows pierced; path 75 miles long.	Do.
Southeastern South Dakota and western and north-central Iowa.	6	2-8:30 p.m.			1,000,000	Series of hail, wind and rain storms; tornado.	Many buildings damaged; auto tops riddled; poultry and livestock killed; crops damaged slight to total; tornado near Holstein.	Do.
Prairie View (near), Kans.	6	7:15 p. m.	220		2,500	Tornado	Farm buildings and railroad section house damaged; path 4 miles long.	Do.
Dane County, Wis.	6	P. m.			2,000	Thunderstorm	Tobacco sheds, silos and small outbuildings blown down.	Do.
Peru, Ind.	7	9:30 a. m.	100		2,500	Possibly tornado	Damage chiefly to barns, outbuildings and fences; path 4 miles long.	Do.
Bloomfield, Ind.	7	12:30 p. m.	880			do	Roofs torn off; trees and poles leveled; path 5 miles long.	Do.
Vernon, Ind.	7	do	235		183,948	Tornado	Property of all kinds damaged or wrecked; 1 person injured; path 2 miles long.	Do.
Chilo, Ohio (over Ohio River).	7	2:50 p. m.				Waterspout	No damage reported	Do.
Kingsport, Tenn.	7				10,000	Wind and rain	Poles, trees and signboards blown down; roof partially torn off warehouse; valuable books damaged by rain.	Do.
Decatur, Ind.	7				do	Hail	No details	Do.
Ohio (northwestern, central; and south-central parts).	7			2	800,000	Wind, hail, electrical.	Chief loss to crops	Do.
Watauga, S. Dak.	8	6:30 p. m.	[1] 5		do	Hail and wind	Small buildings and crops damaged	Do.
Wayne County, Iowa	8	P. m.	1,760		4,300	Hail	Windows and auto tops punctured; crops and livestock injured; path 8 miles long.	Do.
Croghan, N. Y.	9	4:50 p. m.	1,760		6,000	do	Buildings and autos damaged; crops hurt; path 3 miles long.	Do.
Shindler, S. Dak.	9	5:50 p. m.	220		75,000	Tornado	Chief damage to buildings and crops	Do.
Sioux Falls, S. Dak.	9	6:20 p. m.			150,000	do	Buildings and crops damaged	Do.
Springfield (near), Minn.	9				500,000	do	Character of damage not reported; several persons injured.	Do.
Iowa (15 counties, chiefly northern).	9				1,000,000	Wind, rain, hail, electrical, and tornado.	Buildings and crops damaged or wrecked; electric service interrupted; livestock killed or injured; tornado near Larchwood to Sibley.	Do.
Washington (southeastern)	9-10					High wind	Wheat shattered; fruit blown off	Do.
Summit and Pike Counties, Ohio.	10	3 and 3:30 p. m.			60,200	2 tornadoes	Damage to crops and buildings; small loss in Pike County.	Do.
San Jon, N. Mex.	10	6:30 p. m.			1,200	Tornado and hail	Buildings wrecked; crops hurt	Do.
Illinois (southern)	10					Wind and electrical.	Trees blown down; fruit knocked off; corn flattened; electric service interrupted; 2 steamers beached and 1 sunk at Cairo.	Do.
Jasper County, Iowa	10				13,000	Wind and hail	Buildings and crops damaged	Do.
Dane and Greene Counties, Wis.	10				26,200	Wind and thunderstorm.	Damage chiefly to buildings	Do.
Clarkston, Richmond, Garland and Plymouth, Utah.	13	1-2:30 p. m.			205,000	Hail	Heavy loss to crops and gardens; windows broken.	Do.
Bear Valley, Idaho	13				55,000	do	No details reported	Do.
Blackville, S. C.	15	6:30 p. m.	1,760		30,000	Thunderstorm, wind, rain, and hail.	Many business houses unroofed or otherwise damaged; merchandise ruined by rain; crops injured.	Do.
Pittsburgh, Pa.	15	P. m.		1	75,000	Thunderstorm	Large church hall destroyed and small buildings damaged by fire.	Do.
Millport (near), Ohio	16	9-9:15 p. m.	[1] 2			Hail, wind, and rain.	Severe crop damage	Do.
Lagrangeville, N. Y.	17	3 p. m.	[1] 2		10,000	Hail	Chief loss to apples; path 5 miles long	Do.
Washington, Kans.	17	7:30-8 p. m.	[1] 10		2,500	Violent wind	Few houses damaged; schoolhouse demolished	Do.
Mont Belview, Tex.	17		880		31,000	Tornado	32 derricks blown down, 6 houses unroofed; crops damaged.	Do.
Oconto Falls, Coleman, and Pound, Wis.	18	4-6:30 p. m.		1	20,000	Wind and hail	Many farm buildings damaged	Do.
Silver Bow County, Mont.	18-19					do	Heavy damage to crops, buildings, and overhead wire systems.	Do.
Denver, Colo.	19	1:10 p. m.			2,500	Small tornado	3 dwellings and a shed damaged	Do.
Altoona, Pa.	19	P. m.		3		Electrical	8 persons injured	Do.
Ashburn, Va.	22	5:30 p. m.	[1] 2		3,000	Twisting winds	Buildings and crops damaged	Do.
Arcadia, Nebr.	22	8:20 p. m.	[1] 2			Hail	Considerable crop damage in places; path 10 miles long.	Do.
Blountville (near), Tenn.	22				6,000	Electrical	20 head of cattle killed; building and crops damaged.	Do.
Haxtun (near), Colo.	22					Hail	Cornfields damaged 50 per cent	Do.
Philadelphia, Pa.	22	P. m.			50,000	Heavy rain	Much damage by flooding	Do.
Salina, Kans. (7 miles northwest).	23	1:30 p. m.	200		250	Small tornado	Buildings on farm damaged; path 1 mile long	Do.
Evansville, Ind.	23	P. m.			3,000	Electrical	Hotel wire system burned out	Do.
Melbourne and Floyd, Ark. (vicinity of).	23				4,500	do	2 large barns with contents destroyed	Do.

[1] Miles instead of yards.

SEVERE LOCAL STORMS, JULY, 1932—Continued

Place	Date	Time	Width of path (yards)	Loss of life	Value of property destroyed	Character of storm	Remarks	Authority
Virginia (south-central)	24	3-6 p. m.	[1] 1-2		20,000	Twisting winds and hail.	8 tobacco barns wrecked; roofs damaged; crops hurt.	Official, U. S. Weather Bureau.
Hay Springs, Nebr.	24		[1] 2		5,000	Hail	Considerable crop damage in places	Do.
Winnebago County, Iowa.	25	5:30 p. m.			30,000	Wind, hail, and rain.	Crops beaten to ground	Do.
Teton Basin, Idaho	26, 29				10,000	Hail	No details	Do.
Westcliffe (near), Colo.	27	3 p. m.	1,320		3,500	do	Crops damaged 10 per cent to total	Do.
Kingston (near), to Stockholm, Minn.	27	P. m.	440	1	200,000	Tornado	Property loss heavy; scores of persons injured	Do.
Manitowoc, Wis.	28	Midnight -2 a. m.	[1] 5-6		25,000	Severe thunderstorm.	Grandstand demolished; buildings damaged	Do.
Greenview (near), Ill.	28	5:45 p. m.	[1] 2			Hail	Considerable crop damage	Do.
Holmes County, Ohio	28	6:40 - 6:55 p. m.	[1] 2		10,475	do	Property and crop loss considerable	Do.
Henry County, Ind.	28				200,000	do	Extensive crop and property damage	Do.
Ironton, Ohio	28	10 p. m.				Wind	Vast damage in many sections of city; 5 persons injured.	Do.
Washington, Ind.	28				25,000	do	Crops and other property damaged	Do.
Nansemond and Pittsylvania Counties Va.	29	4 p. m.	[1] 1-3		6,500	Hail and wind	Some fields totally destroyed; house blown down.	Do.
Windsor (near), Colo.	29	4-5:30 p. m.	[1] 2		18,000	Hail	Chief damage to crops; path 4 miles long	Do.
Columbus, Chatham, Durham, Edgecombe, Lincoln and Iredell Counties, N. C.	29				30,000	Hail and wind	Crops and property considerably damaged over small areas.	Do.
Pueblo to Colorado Springs, Colo.	29-30				207,000	Heavy rains	Bridges and railway tracks washed out; basements flooded; telephone and telegraph wires damaged; 15,500 acres of cultivated land flooded.	Do.
Travelers Rest and Fountain Inn, S. C.	30				5,500	Wind, hail, electrical.	Schoolhouse burned; cotton and corn hurt	Do.
Belvue to Delia, Kans.	31	6:30 p. m.	440		2,000	Tornadic wind	Residences damaged; path 14 miles long	Do.

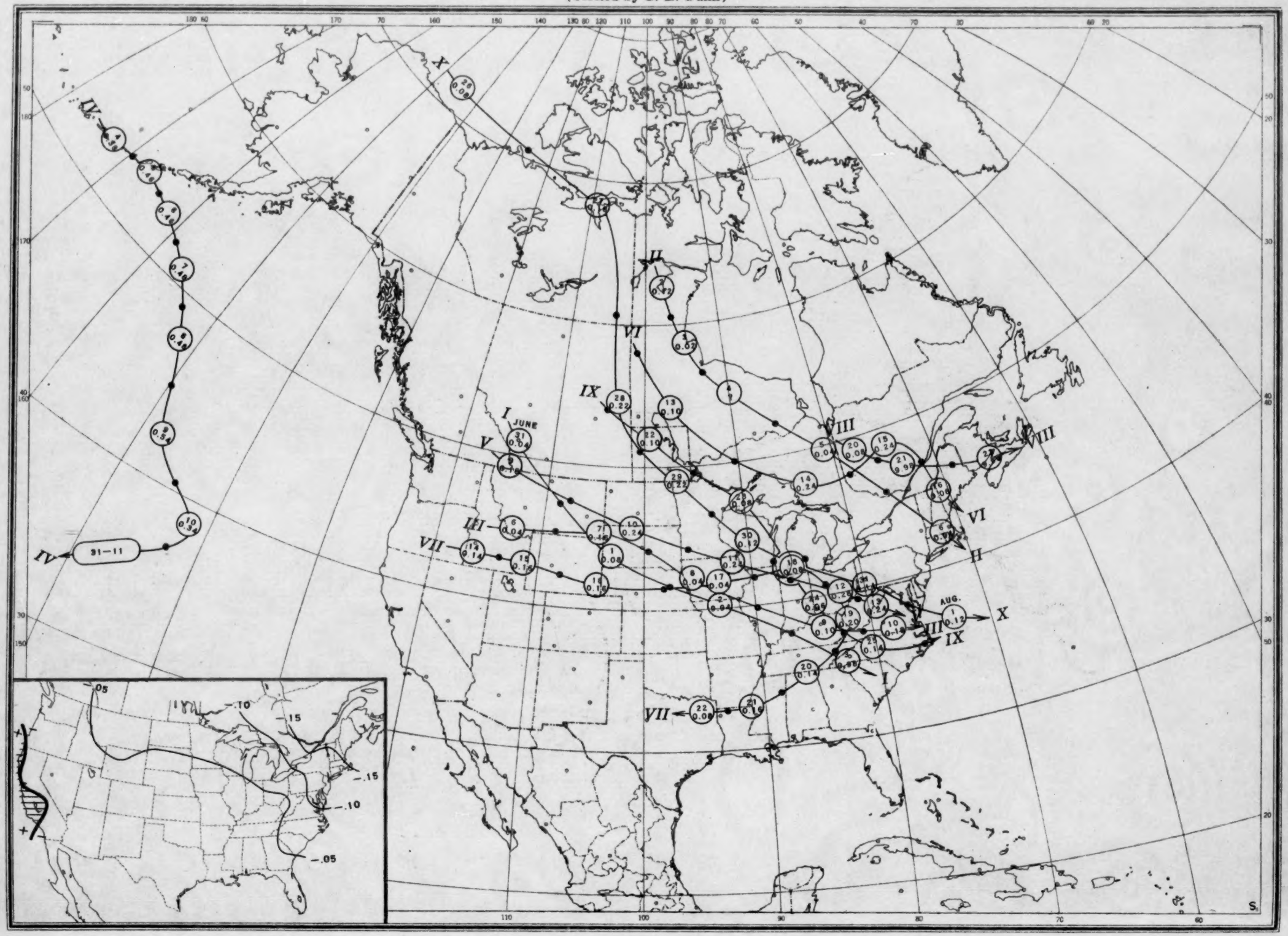
[1] Miles instead of yards.

Chart I. Departure (°F.) of the Mean Temperature from the Normal, July, 1932

Chart I. Departure (°F.) of the Mean Temperature from the Normal, July, 1932

Chart II. Tracks of Centers of Anticyclones, July, 1932. (Inset) Departure of Monthly Mean Pressure from Normal

(Plotted by G. E. Dunn)



Circle indicates position of anticyclone at 8 a. m. (75th meridian time), with barometric reading. Dot indicates position of anticyclone at 8 p. m. (75th meridian time).

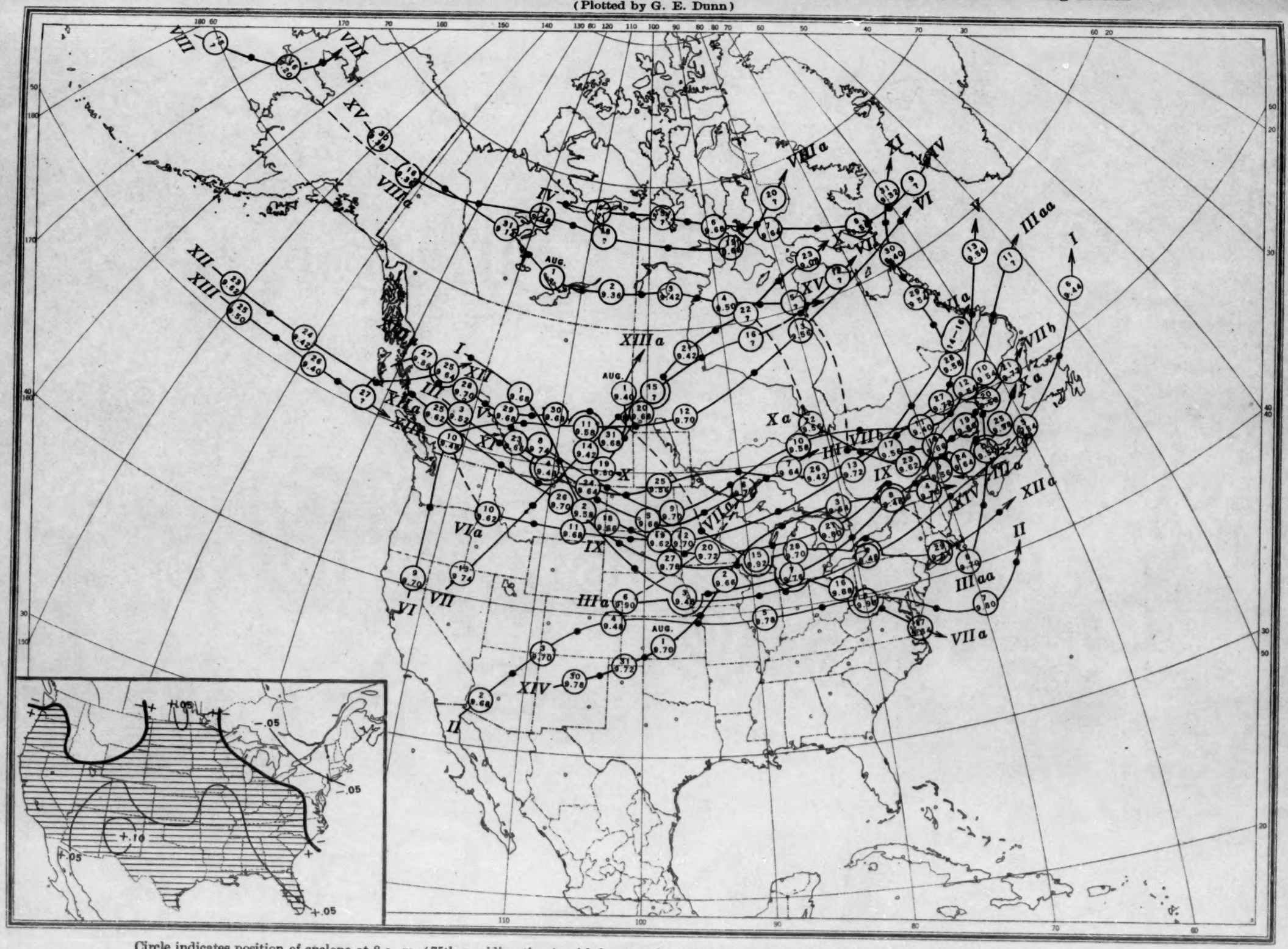
Chart III. Tracks of Centers of Cyclones, July, 1932. (Inset) Change in Mean Pressure from Preceding Month

(Plotted by G. E. Dunn)

Circle indicates position of anticyclone at 8 a. m. (75th meridian time), with barometric reading. Dot indicates position of anticyclone at 8 p. m. (75th meridian time).

Chart III. Tracks of Centers of Cyclones, July, 1932. (Inset) **Change in Mean Pressure from Preceding Month**

(Plotted by G. E. Dunn)



Circle indicates position of cyclone at 8 a. m. (75th meridian time), with barometric reading. Dot indicates position of cyclone at 8 p. m. (75th meridian time).

Chart IV. Percentage of Clear Sky between Sunrise and Sunset, July, 1932

Chart V. Total Precipitation, Inches, July, 1932. (Inset) Departure of Precipitation from Normal

Chart V. Total Precipitation, Inches, July, 1932. (Inset) Departure of Precipitation from Normal

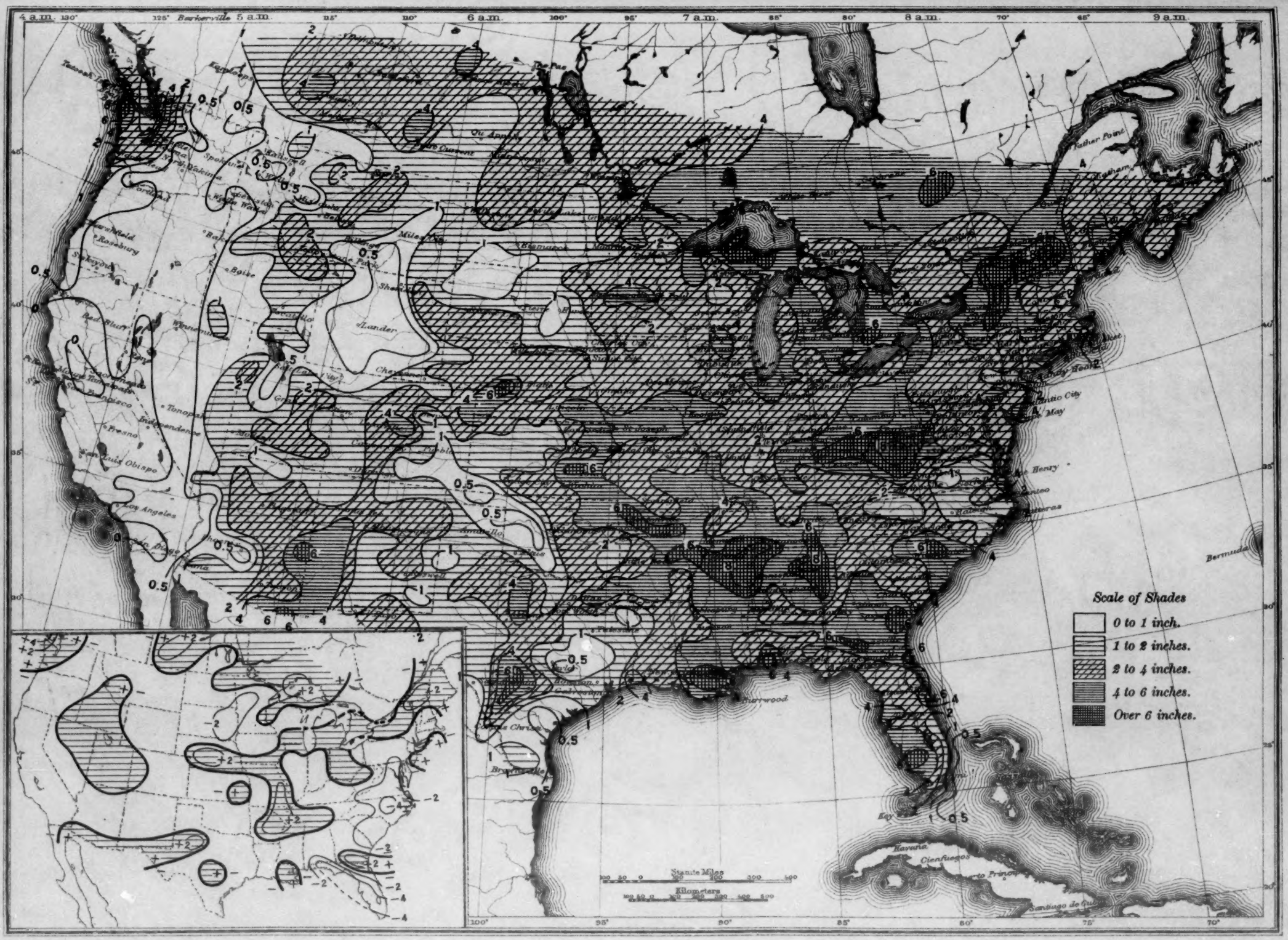


Chart VI. Isobars at Sea level and Isotherms at Surface; Prevailing Winds, July, 1932

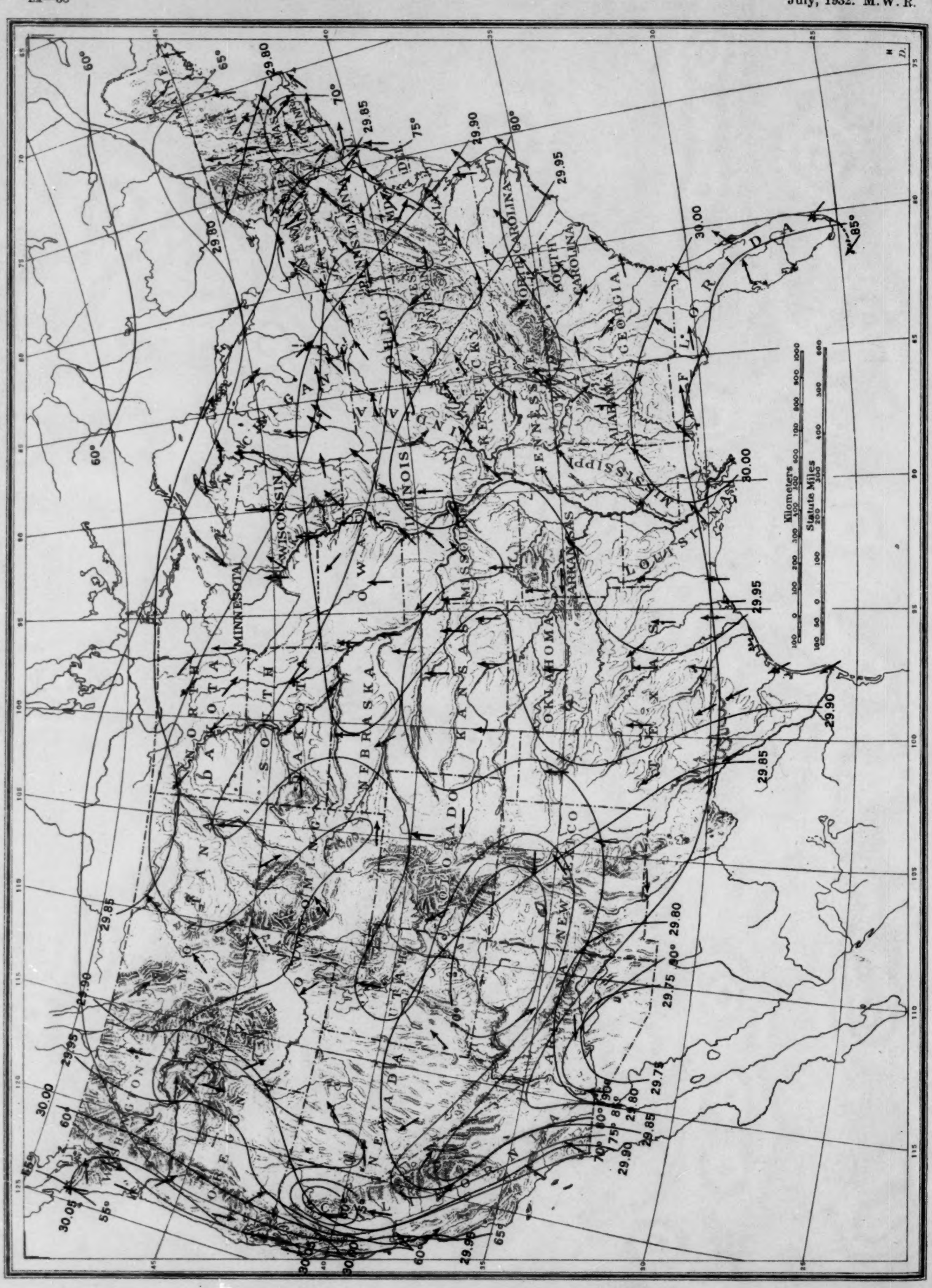


Chart VIII. Weather Map of North Atlantic Ocean, July 5, 1932
(Plotted from the Weather Bureau Northern Hemisphere Chart)

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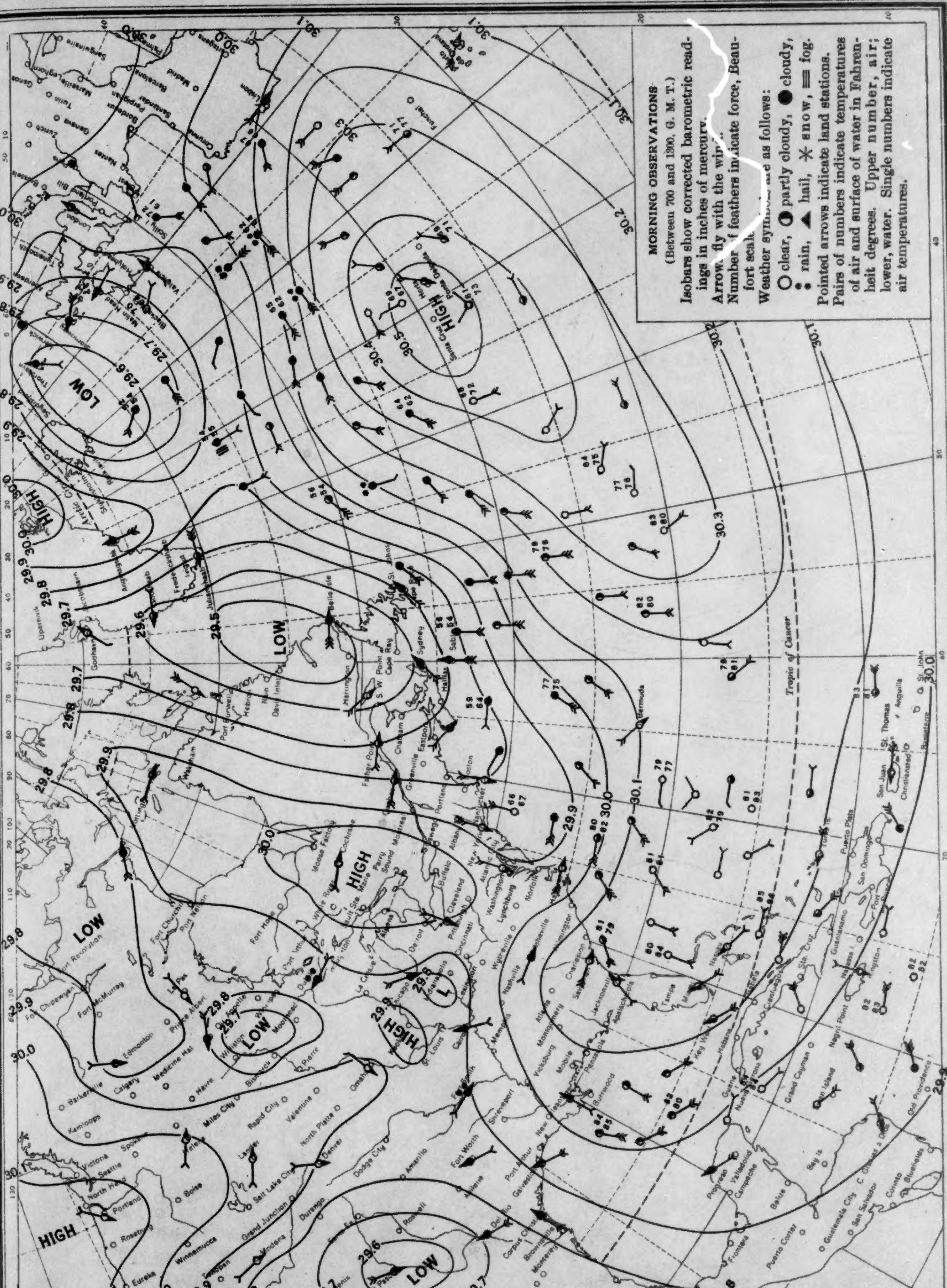

Chart IX. Weather Map of North Atlantic Ocean, July 6, 1932

(Plotted from the Weather Bureau Northern Hemisphere Chart)